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Beyond Consumer Protection: Standardized Stablecoins Disclosure as Information Infrastructure

Shuping Li

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BEYOND CONSUMER PROTECTION: STANDARDIZED STABLECOINS DISCLOSURE AS INFORMATION INFRASTRUCTURE

*Shuping Li**

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INTRODUCTION

Stablecoins are digital assets that are designed to maintain a consistent value relative to a national currency or other designated reference assets.¹ Privately issued stablecoins create a new means of payment that can support faster, more efficient, and inclusive means of payment.² Blockchain offers a new architecture of trust and technically operates as a clearing system for money.³ It replaces a traditional, centralized authority to gather, process, and disseminate information, while achieving scale and network effects.⁴ Stablecoins can be seen as a type of private money that features “denationalisation.”⁵ The market value of these new financial instruments is on the rise.⁶ As of June 2023, the market capitalization of Ethereum was \$209 billion, Tether \$83.5 billion, USD Coin \$28 billion, and XPR \$26 billion.⁷

1. See PRESIDENT’S WORKING GRP. ON FIN. MKTS, THE FED. DEPOSIT INS. CORP., AND THE OFF. OF THE COMPTROLLER OF THE CURRENCY, REPORT ON STABLECOINS 1 (2021) [hereinafter REPORT ON STABLECOINS], https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf.

2. See Darrell Duffie, Digital Currencies and Fast Payment Systems: Disruption is Coming, Presentation to the Asian Monetary Policy Forum (May 2019) (preliminary draft on file with author).

3. See KEVIN WERBACH, THE BLOCKCHAIN AND THE NEW ARCHITECTURE OF TRUST 2-4 (Sandra Braman ed., The MIT Press 2018).

4. Cf. Julia Włodarczyk, *Money as a Network Good*, 20(2) J. ECON. & MGMT. 53, 54 (2015) (Pol).

5. Cf. F.A. HAYEK, DENATIONALIZATION OF MONEY (1976) reprinted in THE MONEY CHANGERS: CURRENCY REFORM FROM ARISTOTLE TO E-CASH, 157 (2015).

6. According to online statistics, the global crypto market cap is \$1.06 trillion; the volume of all stable coins is now \$21.23 billion, which is 94.95% of the total crypto market 24-hour volume. See COINMARKETCAP (June 14, 2023, 11:38 AM), <https://coinmarketcap.com/>.

7. See Cryptocurrency Market Data, SLICKCHARTS, <https://www.slickcharts.com/currency> (last visited June 14, 2023).

Stablecoins claim to have a stable value, either through asset backing or algorithmic adjustment of the money supply.⁸ Yet the market reality seems to be the opposite.⁹ Asset-backed stablecoins may not have sufficient asset reserves.¹⁰ Algorithmic stablecoins that are not pegged to any assets are even more inherently fragile.¹¹ The stable prices are maintained merely because traders expect the coin to have value.¹² If traders lose faith, they could cause the collapse of the stablecoin's value.¹³ These unsecured digital assets attempt to leverage financial engineering, algorithms, and market incentives to anchor the price to the reference asset.¹⁴ This seems a price mechanism that is unstable and permanently vulnerable. For instance, in April 2022, the value of TerraUSD suddenly plunged from one dollar to thirty cents.¹⁵ Issuers and distributors of stablecoins are becoming a new type of shadow bank, whereas stablecoins become a systemically important form of "shadow money."¹⁶ This shadow money does not have explicit government backing, which creates

8. See REPORT ON STABLECOINS, *supra* note 1, at 4.

9. See Klaus Grobys et al., *On the Stability of Stablecoins*, 64 J. EMPIRICAL FIN. 207, 209, 219-21 (2021) (Fin.).

10. See REPORT ON STABLECOINS, *supra* note 1, at 4.

11. See Ryan Clements, *Built to Fail: The Inherent Fragility of Algorithmic Stablecoins*, 11 WAKE FOREST L. REV. ONLINE 131, 131 (2021).

12. Adam S Hayes, *Cryptocurrency Value Formation: An Empirical Study Leading to a Cost of Production Model for Valuing Bitcoin*, 34 TELEMATICS AND INFORMATICS 1316 (2017).

13. See Ryan Clements, *Built to Fail: The Inherent Fragility of Algorithmic Stablecoins*, 11 WAKE FOREST L. REV. ONLINE 131, 132, <http://www.wakeforestlawreview.com/2021/10/built-to-fail-the-inherent-fragility-of-algorithmic-stablecoins/> (2021).

14. See *id.* at 131.

15. See Marco Quiroz-Gutierrez, *After TerraUSD's Crash, Investors Are Rethinking Algorithmic Stablecoins. Mark Cuban Had Already Warned About Their Risks*, FORTUNE: CRYPTO (Apr. 19, 2022, 12:15 PM), <https://fortune.com/crypto/2022/04/19/what-are-algorithmic-stablecoins/>.

16. See generally Daniela Gabor & Jakob Vestergaard, *Towards a Theory of Shadow Money*, INST. FOR NEW ECON. THINKING (Apr. 2, 2016) (on file with City University of London), https://www.ineteconomics.org/uploads/papers/Towards_Shadow_Money_GV_INET.pdf (for discussions on traditional "shadow banking"); Steffen Murau, *Shadow Money and the Public Money Supply: The Impact of the 2007–2009 Financial Crisis on the Monetary System*, 24 REV. INT'L. POL. ECON. 802 (2017); Ramaa Vasudevan, *Shadow Money in the 19th Century: Is Marx Relevant for Understanding Contemporary Shadow Money?*, 30 REV. POL. ECON. 461 (2018); FED. RES. BANK OF NEW YORK, SHADOW BANKING, Staff Rep. No. 458 (July 2010) (revised Feb. 2012).

instability concerns in times of economic downturn and becomes the accelerator of financial crises.¹⁷

It is often underestimated how difficult it is for stablecoin issuers to maintain the stable value of credit money with only fractional reserve or no reserve assets at all.¹⁸ Fraud, negligence, or speculation can be prevalent in the market, as has been seen in the FTX collapse.¹⁹ Perhaps the issuer is unaware of the complexities of currency stability or recognizes the complexities but has no motivation or capability to control the externalities of their product.²⁰ Alternatively, the risk may occur in the long-term that is highly uncertain, or the issuer only wants to make a fortune out of the issuance and will exit the market before the crisis comes up. It is a collective action problem that when the market attempts to provide credit money, issuers, users, and traders lack the common interest in maintaining the stable value of money, especially when these actors have different incentives and intentions.

As a result, stablecoins raise serious regulatory concerns about their impact on market stability and integrity,²¹ as well as their effects on the monetary system and the whole economy.²² Scholars have proposed some regulatory measures such as licensing, disclosure, prudential requirements, and treating cryptocurrency as an analogy to bank money or other monetary

17. Cf. Daniela Gabor & Jakob Vestergaard, *supra* note 16, at 2.

18. See Lai T Hoang & Dirk G Baur, *How Stable Are Stablecoins?*, EUR. J. FIN. (Jan. 31, 2020), <https://doi.org/10.1080/1351847X.2021.1949369>; see generally Adrien d'Avernas et al., *Can Stablecoins be Stable?* (Univ. of Chi., Becker Friedman Inst. for Econ., Working Paper No. 2022-131).

19. Shange Fu et al., *FTX Collapse: A Ponzi Story*, ARXIV PREPRINT ARXIV:2212.09436 (2022); Luke Kowalski et al., *Lackluster Adoption of Cryptocurrencies as a Consumer Payment Method in the United States—Hypothesis: Is This Independent Technology in Need of a Brand, and What Kind?*, 16 J. OF RISK & FIN. MGMT. (2022). Luke Kowalski et al., *Lackluster Adoption of Cryptocurrencies as a Consumer Payment Method in the United States—Hypothesis: Is This Independent Technology in Need of a Brand, and What Kind?*, 16 J. RISK AND FIN. MGMT. (2023)

20. See generally Jean-Jacques Laffont, *Externalities, in Allocation, Information and Markets* (John Eatwell et al. eds., 1989), reprinted in JONATHAN MICHIE, GUIDE TO THE SOCIAL SCIENCES 112, 112–114 (1st ed., 2000).

21. See Sean Foley et al., *Sex, Drugs, and Bitcoin: How Much Illegal Activity is Financed Through Cryptocurrencies?*, 32 REV. FIN. STUD., 1, 1798 (2019).

22. See Christian Catalini & Joshua S. Gans, *Some Simple Economics of Stablecoins*, 1–28, 4, A-7 (Nat'l Bureau of Econ. Rsch., Working Paper No. 22952, Nov. 2022) ANN. REV. FINAN. ECON. 1, 13.

instruments.²³ Stablecoins may be regulated as deposits, issued by banks insured by federal insurance.²⁴ Stablecoin issuers and distributors will be prevented from unlawfully receiving deposits in violation of Section 21(a) of the Glass-Steagall Act.²⁵ There are proposals calling for revisions of the Glass-Steagall Act or the Dodd-Frank Act²⁶ to require stablecoin issuers to become banks insured by the Federal Deposit Insurance Corporation (FDIC) or to run their business out of FDIC-insured banks.²⁷

Stablecoins may also be required to hold safe assets, such as treasuries and central bank reserves, on a one-to-one basis. This is like the requirement imposed on national bank notes during the nineteenth century and the current business model of money market funds.²⁸ These regulatory measures, however, have two major flaws. First, investors' right to information is not protected, which prevents them from making rational investment decisions. Second, the systemic risks of stablecoins are hard to evaluate for the lack of information about each stablecoin's operational mechanism. Ultimately, the most important issue in money markets is trust and integrity.²⁹

To solve these problems, there are two main approaches to regulation: bank-style regulation or securities-style regulation.³⁰

23. See, e.g., Dirk A. Zetzsche, Ross P. Buckley & Douglas W. Arner, *Regulating Libra*, 41 OXFORD J. LEGAL STUD. 80, 98 (2021); Dirk Bullmann, Jonas Klemm & Andrea Pinna, *In Search for Stability in Crypto-assets: Are Stablecoins the Solution?*, at 40 (Eur. Cent. Bank, Occasional Paper Ser. No. 230, 2019); Evan Hewitt, Note, *Bringing Continuity to Cryptocurrency: Commercial Law as a Guide to the Asset Categorization of Bitcoin*, 39 SEATTLE UNIV. L. REV. 619, 638 (2016); Michael Abramowicz, *Cryptocurrency-Based Law*, 58 ARIZ. L. REV. 360, 361 (2016); Henry S. Zaytoun, Comment, *Cyber Pickpockets: Blockchain, Cryptocurrency, and the Law of Theft*, 97 N.C. L. REV. 395, 429 (2019).

24. See Arthur E. Wilmarth, *It's Time to Regulate Stablecoins as Deposits and Require Their Issuers to Be FDIC-Insured Banks*, 41 BANKING & FIN. SERV. POL'Y REP., Feb. 2022, at 1.

25. See Banking Act of 1933 § 21(a), 12 U.S.C. § 227.

26. See Dodd-Frank Wall Street Reform and Consumer Protection Act 12 U.S.C. § 5301 et seq.

27. See Gary B. Gorton & Jeffery Y. Zhang, *Taming Wildcat Stablecoins*, 90 U. CHI. L. REV. 1 (2022).

28. See *id.* at 5.

29. Cf. John R. Boatright, *Trust and Integrity in Banking*, 18 ETHICAL PERSP. 473 (2011).

30. See, e.g., Letter from Joseph J. Barry, Senior Vice President and Global Head of Regulatory, Industry and Government Affairs at State Street Corporation, to Secretariat to the Financial Stability Board (July 15, 2020)

This involves a fundamental policy choice: whether regulators want to directly stipulate the qualifications of stablecoin issuers and align the social function of stablecoins, or whether regulators want to give the freedom of choice to the market. The latter approach means that issuers should publish accurate and reliable information. It is then up to the consumers to choose. The determinant of these two modes of regulation is primarily how far the government could allow for the operation of private money, in the balance between capital control, financial stability, market integrity, regulatory cost and capability, market efficiency, and financial inclusion.³¹

Whatever the specific regulatory approach adopted, stablecoin issuers should disclose information about themselves and their stablecoins. Comprehensive and objective disclosure will allow greater market autonomy and supervision, affecting the behavior of both service providers and recipients. Standardized disclosure is also fundamental to the overall regulatory purpose and strategy, as well as the design of proportionate regulatory standards.³² Existing stablecoin information is fragmented; to a large extent, this information is for advertising, driven by the market mechanism, rather than scientific and rigorous information disclosure. This is because the current disclosure is mostly driven by marketing. Some important but unfavorable information for sales or market development has not been disclosed, and the current market statement can be misleading.³³

This Article intends to develop a framework for understanding why stablecoins disclosure is necessary and why it should be standardized. In evaluating the necessity, methods, and content of stablecoin disclosure, this article proceeds as follows. Part I introduces what stablecoin is or claims to be. Part II explains why disclosure is necessary for consumer protection and market stability. Part III studies the contents that issuers are required to disclose, namely the issuer's qualification, information on

(“Addressing the Regulatory, Supervisory and Oversight Challenges Raised by Global Stablecoin Arrangements”).

31. See Christian Catalini et al., *supra* note 22, at 22-23; see also Douglas Arner et al., *Stablecoins: Risks, Potential and Regulation*, at 14 (Bank for Int'l Settlements, Working Paper No. 905, 2020).

32. See Emily Jones & Peter Knaack, *Global Financial Regulation: Shortcomings and Reform Options*, 10 GLOB. POL'Y 193, 193 (2019).

33. Ryan Clements, *Built to Fail: The Inherent Fragility of Algorithmic Stablecoins*, 11 WAKE FOREST L. REV. ONLINE (2021).

stablecoins, and transaction rules. The issuer's qualification includes the governance body and beneficiaries, the financial statement and reserve assets, and the business strategy and investment plan. Information on stablecoins includes the purpose of and technologies used for the stablecoin, the price stabilization mechanism and rationale, the issuance quantity, and the risk factors that influence the value of the stablecoin. Part IV discusses the importance of standardized and structured disclosure. Part V concludes by emphasizing the significance and necessity of disclosure to address the knowledge dilemma in designing proportionate regulatory rules for private money.

I. WHAT IS A STABLECOIN?

A. Asset-Backed Stablecoins

Asset-backed stablecoins claim to have sufficient assets to back the stable value of the instrument.³⁴ These “reserve assets” can include fiat currencies, US Treasury bills, commercial paper, corporate and municipal bonds, shares, and other digital assets.³⁵ Nevertheless, there are no standards regarding the composition of stablecoin reserve assets to ensure their authenticity and credibility. Even where stablecoin issuers reserve deposits at insured depository institutions, deposit insurance does not necessarily extend to the stablecoin owners.³⁶ If the stablecoin issuer deposits fiat currency (cash issued by the government) reserves at an FDIC-insured bank and does so in a manner that meets all requirements for “pass-through” deposit insurance coverage, the deposit would generally only be insured to each stablecoin holder individually for up to \$250,000.³⁷ Without pass-through coverage, the deposit at the bank would be insured only to the stablecoin issuer itself for up to \$250,000 (stablecoin holders have no guarantee as to how much they can get back).³⁸

34. See REPORT ON STABLECOINS, *supra* note 1, at 4, 6.

35. CHARLES YU, GALAXY DIGIT. RSCH., DIGITAL DOLLARS: AN OVERVIEW OF STABLECOINS TODAY AND TOMORROW 11 (2022), <https://www.galaxy.com/research/whitepapers/digital-dollars-in-depth-stablecoins/>.

36. Cf. Todd Phillips, *Tokenized Deposits: How I Learned to Stop Worrying and Love Stablecoins*, SSRN 25 (2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4152735.

37. See REPORT ON STABLECOINS, *supra* note 1, at 4.

38. See 12 C.F.R. § 330.5 (1999).

B. Algorithmic Stablecoins

Algorithmic stablecoins use an algorithm or smart contract to manage the supply of tokens and guide their value to some reference asset (such as the US dollar).³⁹ When the stablecoin's price exceeds a certain threshold, the issuer will generate new stablecoins to reduce their prices.⁴⁰ When the price of stablecoins falls, the issuer will buy stablecoins at a lower price to reduce the number of stablecoins in circulation.⁴¹ The decrease in stablecoin supply is expected to bring up the stablecoin's price.⁴² Algorithmic stablecoins do not achieve stable value by maintaining a reserve of fiat-denominated assets with an equivalent value of the stablecoins.⁴³ Instead, the supply and value of the stablecoin are controlled through an algorithm that "mints" or "burns" coins.⁴⁴

II. WHY PUBLIC DISCLOSURE?

Stable value is one of the core features of money. The unstable monetary value may cause inflation and financial instability.⁴⁵ Maintaining the stable value of money is not an easy task. First, the stabilizing capability of an algorithm is often overestimated, whereas the vulnerability to risks is underestimated.⁴⁶ Therefore, algorithmic central banks are unconvincing, because central bank functions go beyond managing the quantity of money.⁴⁷ In many ways, fiat money is related to taxation, and fiscal and monetary policies.⁴⁸ The public interest and social choice

39. See Christian Catalini, et al., *supra* note 22, at 124.

40. See Amani Moin et al., *SoK: A Classification Framework for Stablecoin Designs*, in FIN. CRYPTOGRAPHY AND DATA SEC. 6 (Joseph Bonneau & Nadia Heninger eds. 2020) Amani Moin, et al., *SoK: A Classification Framework for Stablecoin Designs* (Springer 2020).

41. See *id.* at 6.

42. See *id.* at 6, 9.

43. See Richard K. Lyons & Ganesh Viswanath-Natraj, *What Keeps Stablecoins Stable?*, 131 J. INT'L MONEY & FIN. 3 (2023).

44. See *id.* at 2.

45. See Anna J Schwartz, *Why Financial stability Depends on Price Stability*, in MONEY, PRICES AND THE REAL ECONOMY (1998).

46. See generally Clements, *supra* note 11.

47. See generally Claudio Borio, *On Money, Debt, Trust, and Central Banking*, 39 CATO J. 267, 274 (2019).

48. See generally Christopher A. Sims, *A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy*, 4 ECON. THEORY 381, 381 (1994); Dror Goldberg, *The Tax-foundation*

concerning money are largely reflected in the rationale and tools of monetary policy,⁴⁹ a product of modern macroeconomics that coordinates various social economic components in an economy.⁵⁰ The social-economic rationale of monetary policy thus provides important references for the issuance and operation of a monetary system, including both public and private money.⁵¹

Second, like other financial instruments, stablecoins are susceptible to arbitrage and strategic transactions such as short sales and exhibit synergies with other assets. Algorithmic stablecoins are particularly prone to runs, destabilization, and failure when reality deviates from the assumptions underlying the embedded incentive structure.⁵² Stablecoins are fragile because they rely on independent, self-interested investors who have an interest in making money from the algorithm meant to keep TerraUSD pegged to a dollar.⁵³ In addition, fluctuations in market sentiment can affect stablecoin prices.⁵⁴ Confidence in stablecoins can be affected in several ways: declines in reserve asset prices, reduced liquidity, or loss; unclear redemption rights or difficulties for stablecoin holders; and operational risks associated with cybersecurity and data collection, storage, and protection.⁵⁵

An example of such price volatility is TerraUSD. TerraUSD used to be the third largest stablecoin by market capitalization behind USD Coin (USDC) and Tether (USDT).⁵⁶ It was also once

Theory of Fiat Money, 50 *ECON. THEORY* 489, 489 (2012); Khalid Saeed, *Taxation of Fiat Money Using Dynamic Control*, 10 *SYSTEMS* 1 (2022); Saroj Dhital et al., *Monetary and Fiscal Policy Interactions in a Frictional Model of Fiat Money, Nominal Public Debt and Banking*, 139 *EUR. ECON. REV.* 1 (2021).

49. See generally ALLAN M. FELDMAN & ROBERTO SERRANO, *WELFARE ECONOMICS AND SOCIAL CHOICE THEORY* 59 (2nd ed. 2006).

50. See generally TORSTEN PERSSON & GUIDO TABELLINI, *POLITICAL ECONOMICS: EXPLAINING ECONOMIC POLICY* 115 (2002).

51. See Benjamin M. Friedman, *Monetary Policy* (Nat'l Bureau of Econ. Resch., Working Paper No. 8057, 2000).

52. See Clements, *supra* note 11, at 132, 143.

53. *Id.*

54. See generally Blanka Łęć et al., *What Drives the Popularity of Stablecoins? Measuring the Frequency Dynamics of Connectedness between Volatile and Stable Cryptocurrencies*, 189 *TECH. FORECASTING & SOC. CHANGE* (2023).

55. See PABLO D. AZAR ET AL., *FED. RSRV. BANK N.Y., THE FINANCIAL STABILITY IMPLICATIONS OF DIGITAL ASSETS* (Staff Rep., No. 1034, 2022).

56. See TERRA, <https://www.terra.money/> (last visited Sep. 9, 2022).

among the largest cryptocurrencies by market cap.⁵⁷ TerraUSD was created to maintain the coin's dollar value through a system that relies on traders burning or creating tokens for profit to maintain a stable price.⁵⁸ The price stabilization mechanism is achieved by pairing TerraUSD with Luna, another Terraform Labs cryptocurrency.⁵⁹ Every time a TerraUSD token is minted, the equivalent of one dollar of Luna is burned, and vice versa.⁶⁰ When the price of TerraUSD falls below one dollar, traders can either burn TerraUSD, or remove it from circulation in exchange for one dollar in Luna.⁶¹ This reduces the supply of TerraUSD tokens and therefore increases the price of the token. If the price of TerraUSD exceeds one dollar, traders are incentivized to burn Luna in exchange for one dollar of TerraUSD, which increases its supply and lowers the price. The algorithm-based price stabilization mechanism has been largely successful, with TerraUSD falling well below one dollar only twice since its creation in 2020, to around eighty-five cents in December 2020.⁶² On May 10, 2022, the ratio of Luna to TerraUSD market cap suddenly declined to less than 0.5 (which means Luna holders cannot redeem even half a TerraUSD for 1 Luna).⁶³

This large value fluctuation in a short period shows the fragility and ineffectiveness of the value stabilization mechanism of algorithmic stablecoins. This leads to at least two considerations. One is whether the currency issuer honestly and diligently maintains the stability of the stablecoin value; specifically, whether it believes that the designed currency stabilization

57. Oxford Analytica, *Crypto Turmoil Fuels US Rules and Digital Dollar Plan*, EMERALD EXPERT BRIEFINGS (2022).

58. See *Terra (blockchain)*, WIKIPEDIA, [https://en.wikipedia.org/wiki/Terra_\(blockchain\)](https://en.wikipedia.org/wiki/Terra_(blockchain)) (last visited Mar. 7, 2023).

59. See *id.*

60. Marco Quiroz-Gutierrez & Taylor Locke, *A 'stable' coin lost its peg over the weekend and pledged \$1.5 billion in Bitcoin trying to stabilize. Here's how the algorithmic stablecoin was supposed to work—and didn't*, FORTUNE CRYPTO (May 10, 2022, 2:49 PM), <https://fortune.com/2022/05/10/what-is-algorithmic-stablecoin-terrausd-bitcoin-crash/amp/>.

61. *Id.*

62. Marco Quiroz-Gutierrez, *After TerraUSD's crash, investors are rethinking algorithmic stablecoins. Mark Cuban had already warned about their risks*, FORTUNE (Apr. 20, 2022), <https://fortune.com/2022/04/19/what-are-algorithmic-stablecoins/>.

63. See Amit Chaudhary & Ganesh Viswanath-Natraj, *Algorithmic stablecoins and devaluation risk*, VOX CEPR (May 13, 2022), <https://cepr.org/voxeu/columns/algorithmic-stablecoins-and-devaluation-risk>.

mechanism is appropriate and effective and implements the mechanism with integrity. The second is whether the currency issuer can design and maintain the value stability mechanism, especially in emergencies or abnormal situations. Information plays an important role in maintaining and monitoring these two issues.

A. Anti-Fraud

Stablecoins suffer from serious trust and integrity problems.⁶⁴ What stablecoin issuers state can be irresponsible, incomplete, or untrue, especially if there is no legal consequence for such misrepresentation. Stablecoin issuers, together with trading platforms, present risks of fraud, misappropriation, and conflicts of interest, including those arising from misleading disclosures to the market, misuse of inside information, and manipulative trading activities.⁶⁵

In particular, algorithmic stablecoins send a false signal to the market—the value of various tokens can be kept stable with pure algorithm. Such kind of propaganda can be as light as misleading and as serious as fraud. The so-called algorithmic stable value cannot be stable because of the tendency of over-issuance, credit risks, heterogeneous demand for money, irrational behaviors by consumers, information gaps, and fundamental uncertainties in the market. From a monetary perspective, the value of money can hardly be maintained stable with pure algorithmic operations. Monetary economists have not reached a consensus on how the pricing of money works because value represents a complex relationship and is not a direct mode of expressing a ratio.⁶⁶ While the monetarism school argues that the value of money is determined by supply and demand, like the market price of a commodity, propertyism (the effective demand theory,

64. See generally Abeba N. Turi & Chiranthi Thilakarathnei, *Shock-Resistant Programmable Money: Stablecoins*, in FINANCIAL TECHNOLOGIES AND DEFI: A REVISIT TO THE DIGITAL FINANCE REVOLUTION 67 (Abeba N. Turi ed., 2023).

65. Joel Seligman, *The Rise and Fall of Cryptocurrency: The Three Paths Forward*, WASH. UNIV. IN ST. LOUIS LEGAL STUD. RSCH. PAPER 21 (2022).

66. See generally Thomas J. Sargent, *Expectations and the nonneutrality of Lucas*, 37 J. MONETARY ECON. 535 (1996); George W. Evans & Garey Ramey, *Adaptive Expectations, Underparameterization and the Lucas Critique*, 53 J. MONETARY ECON. 249 (2006); Robert E. Lucas, Jr., *Expectations and the Neutrality of Money*, 4 J. ECON. THEORY 103 (1972).

argued by Marx, Kalecki, Keynes) believes that the value of money is determined by some exogenous considerations.⁶⁷ For monetarists, the demand for money, and thus the optimal supply of money, depends on market expectations, which involves estimating the probabilities of future trends and situations.⁶⁸ Such expectations can have unfortunate destabilizing effects.⁶⁹ A system can overreact to its predictions and “go into unstable oscillations,” especially when each actor tries to anticipate the actions of others and their expectations.⁷⁰ Common results of such destabilizing expectations are speculative bubbles, hyperinflation, and business cycles.⁷¹

By contrast, propertyists argue that “capitalism cannot exist, and never has existed, in isolation as a closed, self-contained system.”⁷² Capitalism requires a legal system to enforce property rights, contracts, and regulations; it operates within a social and cultural context, shaped by norms, values, and institutions, in a domestic and global environment. Whereas market participants are like herds that are prone to stampedes, laws and regulations are needed to reduce the risk of stampedes by erecting monetary “fences” (laws and regulations that are implemented to reduce the likelihood of irrational and destabilizing behavior in the market).⁷³ The source of risks is often undiscoverable as there are

67. See Eckhard Hein, *The Principle of Effective Demand: Marx, Kalecki, Keynes, and Beyond*, in *THE ROUTLEDGE HANDBOOK OF HETERODOX ECONOMICS* 84, 84 (2017).

68. See Stephen M. Goldfeld & Daniel E. Sichel, *The Demand for Money*, in *1 HANDBOOK OF MONETARY ECONOMICS* 300, 324, 342. (B.M. Friedman & F. H. Hahn eds., 1990); Stephen M. Goldfeld, *The Demand for Money Revisited*, 3 *BROOKINGS PAPERS ON ECON. ACTIVITY* 577, 646 (1973); Milton Friedman, *The Demand for Money: Some Theoretical and Empirical Results*, 67 *J. POL. ECON.* 327, 349 (1959); John V. Duca & David D. VanHoose, *Recent Developments in Understanding the Demand for Money*, 56 *J. ECON. AND BUS.* 247, 265 (2004).

69. See Maurice Obstfeld, *Destabilizing Effects of Exchange-Rate Escape Clauses*, 43 *J. INT'L ECON.* 61, 63 (1997).

70. See HERBERT A. SIMON, *THE SCIENCES OF THE ARTIFICIAL* 36 (3rd ed. 1996).

71. Cameron Harwick, *Bubbles and Broad Monetary Aggregates: Toward a Consensus Approach to Business Cycles*, 45 *EASTERN ECON. J.* 250, 257 (2019).

72. See generally PRABHAT PATNAIK, *THE VALUE OF MONEY* 4, xi (2009).

73. William BP Robson, *New Currency Regimes: How Green the Grass? How High the Fence?*, 45 *POL'Y* 45, 45 (2001).

many fundamental uncertainties in the market.⁷⁴ Uncertainties persuade social systems to use hierarchy rather than markets in making decisions.⁷⁵ Flexibility is essential in times of uncertainty, yet markets often fail to offer optimal levels of flexibility during such periods.⁷⁶ When faced with uncertainty concerning numerous facts about distinct markets, decentralized pricing becomes an appealing option.⁷⁷ When uncertainty involves significant events that will impact multiple aspects of the organization in a consistent manner, it can be beneficial to centralize the process of making assumptions about the future. In such cases, decentralized units are then required to base their decisions on these assumptions.⁷⁸ The complexity of the market, in part, arises from such uncertainties in the set of arrangements and actions.⁷⁹ In this complex system, various entities such as consumers, firms, banks, investors, and government agencies engage in activities like buying, selling, speculating, trading, overseeing, producing goods, offering services, investing in companies, strategizing, exploring, forecasting, competing, learning, innovating, and adapting.⁸⁰

What is more, the value of money involves a balance between various interests and is related to other social elements. The demand and supply theory,⁸¹ and the subsequent quantity theory of money,⁸² argue that money should be provided at a socially optimal quantity.⁸³ The definition of “socially optimal” necessarily prioritizes some interests and concerns over others, like

74. See Ahdi Noomen Ajmi et al., *Causality Between US Economic Policy and Equity Market Uncertainties: Evidence from Linear and Nonlinear Tests*, 18 J. APPLIED ECON. 225, 228–29 (2015).

75. Libby Weber & Kyle Mayer, *Transaction Cost Economics and the Cognitive Perspective: Investigating the Sources and Governance of Interpretive Uncertainty*, 39 ACAD. OF MGMT. REV. 344, 346 (2014).

76. See SIMON, *supra* note 70, at 43.

77. See *id.*

78. See *id.*

79. W. Brian Arthur, *Complexity Economics: A Different Framework for Economic Thought 2* (Santa Fe Inst., Working Paper No. 2013-04-012, 2013).

80. See *id.*

81. See Jacques Melitz & Morris Pardue, *The Demand and Supply of Commercial Bank Loans*, 5 J. MONEY, CREDIT & BANKING 669, 669 (1973).

82. See generally MILTON FRIEDMAN, QUANTITY THEORY OF MONEY, in 4 THE NEW PALGRAVE: A DICTIONARY OF ECONOMICS 3 (MONEY 3 (John Eatwell, Murray Milgate &, and Peter Newman eds. 1987).

83. See Aleksander Berentsen, *On the Private Provision of Fiat Currency*, 50 EUR. ECON. R. 1683, 1684 (2006).

the inflation target and employment rates. Some post-Keynesian macroeconomic paradoxes⁸⁴ even suggest that achieving the stable value of money may not achieve the intended objective and even sacrifice other socio-economic interests.⁸⁵ These paradoxes include, for example, efforts to de-leverage may lead to higher leverage ratios, because economic changes trigger all kinds of cyclical oscillation which, by inspiring new inventions and investment, leads to a greater volume of over-indebtedness and attempts to liquidate.⁸⁶ New ways of creating liquidity may end up transforming liquid assets into illiquid ones,⁸⁷ and the availability of individual risk cover leads to more risk overall.⁸⁸ Fluctuation and instability are the inherent characteristics of modern capitalism.⁸⁹ Even stability itself can be destabilizing because investment is largely a prediction of how others are behaving.⁹⁰ Once expectations about the future are shaken, distress tends to cascade through the system causing a systemic crisis.⁹¹

84. These include, for example, paradox of thrift (higher saving rates lead to a reduction in total saving), paradox of debt (efforts to de-leverage might lead to higher leverage ratios), and paradox of tranquility (stability is destabilizing). The mechanism of thrift paradox is that when people save, they spend less, therefore businesses realize less revenue and reduce investment. Thereby, aggregate income declines and so does total saving. The mechanism of debt paradox is that when everybody saves more out of their income to repay debt, aggregate income declines and leverage ratios rise. The mechanism of tranquility paradox is that a stable economy makes people more optimistic, leading to higher risk taking and higher gross debt-income ratios, which creates instability. See Marc Lavoie, *Post-Keynesian Economics: New Foundation*, 36 (Edward Elgar Publishing, 2022).

85. Cf. Eckhard Hein & Marc Lavoie, *Post-Keynesian Economics*, in THE ELGAR COMPANION TO JOHN MAYNARD KEYNES, 540, 543–44 (2019).

86. See Irving Fisher, *The Debt-Deflation Theory of Great Depressions*, 1 ECONOMETRICA 337, 349 (1933); JOSEF STEINDL, MATURITY AND STAGNATION IN AMERICAN CAPITALISM 2 (1952).

87. See ANASTASIA NESVETAILOVA, FRAGILE FINANCE: DEBT, SPECULATION AND CRISIS IN THE AGE OF GLOBAL CREDIT 76–77 (2007).

88. See Albert M. Wajnilower, *The Central Role of Credit Crunches in Recent Financial History*, (2BROOKINGS PAPERS ON ECON. ACTIVITY, 1980), No. 2, at 277 (1980).

89. See Alessandro Vercelli, *Fluctuations and Growth: Keynes, Schumpeter, Marx and the Structural Instability of Capitalism*, 1984 PAPERS POL. ECON. 279, 285.

90. Hyman P Minsky, *The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to “Standard” Theory*, 20 CHALLENGE (1977).

91. See Anastasia Nesvetailova, *Dilemmas and Paradoxes of Fragile Finance*, FRAGILE FINANCE: DEBT, SPECULATION AND CRISIS IN THE AGE OF GLOBAL CREDIT 74 (2007).

In short, the market is a complex adaptive system which sways between equilibrium and chaos.⁹² Equilibria, as they exist, are an important organizing force in social systems, although there are no prior reasons to think that equilibria must exist.⁹³ The absence of equilibria does not automatically imply a lack of predictability and understanding.⁹⁴ The monetary value is a result of several factors, and there may be multiple equilibria, rather than a simple matching of supply and demand.⁹⁵

The relative stable value of fiat currency is enabled by the inherent nature of the central bank endorsed by the state and its taxation power.⁹⁶ In contrast, algorithmic stablecoins such as Basis asserted their intention to implement monetary policy transparently and in a decentralized manner, entirely devoid of any direct human intervention.⁹⁷ The mechanism responsible for preserving the value has the flexibility to shift away from being pegged to the US dollars and instead adopt a consumer price index or a basket of goods as its reference.⁹⁸ Such statements are fraudulent in that they knowingly or unknowingly understate the difficulty and complexity of keeping the stable value of money in modern financial markets, and the role of law in maintaining the value of licensed or approved money.⁹⁹

92. Morris B Holbrook, *Adventures in Complexity: An Essay on Dynamic Open Complex Adaptive Systems, Butterfly Effects, Self-organizing Order, Co-evolution, the Ecological Perspective, Fitness Landscapes, Market Spaces, Emergent Beauty at the Edge of Chaos, and All That Jazz*, 6 ACADEMY OF MARKETING SCIENCE REVIEW (2003).

93. See Robert A. Moffitt, *Policy Interventions, Low-level Equilibria, and Social Interactions*, SOCIAL DYNAMICS 45, 46 (Steven N. Durlauf & H. Peyton Young eds., 2001).

94. See JOHN H. MILLER & SCOTT E. PAGE, COMPLEX ADAPTIVE SYSTEMS: AN INTRODUCTION TO COMPUTATIONAL MODELS OF SOCIAL LIFE 223 (2007).

95. Paul Krugman, *Balance Sheets, the Transfer Problem, and Financial Crises*, in INTERNATIONAL FINANCE AND FINANCIAL CRISES (Assaf Razin Peter Isard, Andrew K. Rose ed. 1999).

96. Stephanie Bell, *The Role of the State and the Hierarchy of Money*, 25 CAMBRIDGE J. OF ECON. 149, 154 (2001).

97. See Fergus Hudson, *New Cryptocurrency to Mimic Algorithmic Central Bank*, AM. INST. FOR ECON. RSCH. (July 13, 2018), <https://www.aier.org/article/new-cryptocurrency-to-mimic-algorithmic-central-bank/>.

98. See *id.*

99. Resilient Banks, *Banking Systems*, BANK FOR INTERNATIONAL SETTLEMENTS, JUNE (2010).

B. Consumer Protection

An important role of the law in maintaining market order is to provide sufficient information for consumers and investors to make rational transaction decisions.¹⁰⁰ For example, do consumers really understand the products they are buying and the risks they undertake? How can stablecoin users know that stablecoin issuers have sufficient reserve assets? How do payment platforms ensure transaction security and finality? Consumers need to know, in the event of a transaction error or a credit crisis, whether there are sufficient reserve funds to maintain value stability. A major source of financial crises is systemic cognitive biases and errors.¹⁰¹ Disclosure requirements for currency issuers and maintainers will help consumers make clear judgments about which financial products they want to buy or sell.

Information gaps and asymmetries are prevalent in the financial market.¹⁰² Money users often find it difficult to know the redemption or repayment capability of the money issuer in terms of the pegged assets they claimed for their money. Information gaps in the stablecoin market challenge the assumption that money is insensitive to information,¹⁰³ as money users suddenly need information to make storage or transaction decisions. Information gaps also hamper market and regulatory responses and may dampen the impact of shocks once panic spreads.¹⁰⁴ For money users, incomplete information only exacerbates the irrational behavior and contagion effects in the market. In times of

100. Morris Altman, *Implications of Behavioural Economics for Financial Literacy and Public Policy*, 41 J. OF SOCIO-ECON. 677, 677 (2012).

101. Emiliios Avgouleas, *The Global Financial Crisis, Behavioural Finance and Financial Regulation: in Search of a New Orthodoxy*, 9 JOURNAL OF CORPORATE LAW STUDIES 23, 31 (2009).

102. See generally Rahul Ravi & Youna Hong, *Firm Opacity and Financial Market Information Asymmetry*, 25 J. EMPIRICAL FIN. 83, 83 (2014); Jae-Joon Han & Wonchang Jang, *Information Asymmetry and the Financial Consumer Protection Policy*, 21 ASIAN J. POL. SCI. 213, 213 (2013); Regina Wittenberg-Moerman, *The Role of Information Asymmetry and Financial Reporting Quality in Debt Trading: Evidence from the Secondary Loan Market*, 46 J. ACCT. AND ECON. 240, 241 (2008); Gilles Hilary, *Organized Labor and Information Asymmetry in the Financial Markets*, 11 REV. ACCT. STUD. 525, 526 (2006); Ahmed Elbadry et al., *Governance Quality and Information Asymmetry*, 24 J. FIN. MKTS, INSTRS. & INSTRUMENTS 127, 127 (2015).

103. Cf. Kathryn Judge, *Information Gaps and Shadow Banking*, 103 VA. L. REV. 411, 411 (forthcoming May 2017).

104. See *id.* at 149.

crisis, this type of stablecoin could be prone to losing value based on traders acting on unclear information and uncertainty. It could cause a herd mentality that could result in a broad selloff and the price of the stablecoin to fall.¹⁰⁵ Consequently, stablecoins could be prone to “bank runs” if money holders keeping the price afloat decide to take their money out of the system over a short period.¹⁰⁶ Furthermore, the assertion that stablecoins can keep stable value with algorithms, exacerbates information asymmetries. The information asymmetry in the digital market, the asymmetry in investigative and bargaining power, and the irrational behavior of consumers and investors, adds to the perplexity of such a narrative.

Allowing consumers to make a rational investment decision is one of the justifications for mandatory disclosure.¹⁰⁷ The reason is that consumers do not always realize and understand the risks they are taking. In a world of limited and asymmetric information, herding and other irrational behaviors, money creators, which are found largely on trust and fractional reserve, are inherently vulnerable to runs and crises, endangering institutional and market stability.¹⁰⁸ As is the same with other financial instruments, the money market is perplexed by irrational behaviors such as over-speculation, emotional bias, and cognitive errors, which can lead to systemic deviation and Ponzi schemes.¹⁰⁹ The law should debias the agent’s judgment error by providing clear warnings about the risks of speculation.¹¹⁰ The interference of a state against personal wills may be helpful if the person interfered with becomes better off or is protected from harm.¹¹¹ Nudge economics argues that the government should

105. Steven Haryanto, et al., *Disposition Effect and Herding Behavior in the Cryptocurrency Market*, 47 J. OF INDUS. & BUS. ECON. 115, 115 (2020).

106. Dr. Ryan Clements, *Built to Fail: The Inherent Fragility of Algorithmic Stablecoins*, WAKE FOREST L. REV. ONLINE (2021), <https://www.wakeforestlaw-review.com/2021/10/built-to-fail-the-inherent-fragility-of-algorithmic-stable-coins/>.

107. John C Coffee Jr, *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VIRGINIA LAW REVIEW 717, 222 (1984).

108. See Kevin Dowd, *US Banking in the “Free Banking” Period*, in THE EXPERIENCE OF FREE BANKING 206, 62-63 (Kevin Dowd ed., 1992).

109. Minsky, CHALLENGE 25 (1977).

110. Christine Jolls & Cass R. Sunstein, *Debiasing through Law* 15 (John M. Olin L. & Econ. Working Paper No. 225, 2005).

111. Cf. Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism Is Not an Oxymoron* 1, 5 (John M. Olin L. & Econ. Working Paper No. 185, 2003).

influence consumers toward their utility-maximizing preference by overcoming cognitive biases and decisional inadequacies.¹¹² Furthermore, there are increasing discussions on imposing holding and spending limits on money.¹¹³ Loans, credits, investments, and consumptions are restricted to the extent that the total money supply in society must be kept in a proper range.¹¹⁴

Sudden shortages in money supply and systemic deviation of money prices create irrational booms and busts.¹¹⁵ The financial system is inherently fragile in that hedge financing (an investment that is made with the intention of reducing the risk of adverse price movements in an asset) can easily fall into speculative and Ponzi financing because success in a boom enhances expectations.¹¹⁶ Aggregate market speculation and arbitrage in the further circulation of debt instruments can cause volatility and instability in the monetary system.¹¹⁷ At the hedge finance stage, income flows are expected to meet financial obligations in every period.¹¹⁸ At the speculative finance stage, the firm must roll over debt because income flows can cover only interest costs.¹¹⁹ In terms of Ponzi finance, income flows cannot cover interest costs, so the firm must borrow more or sell assets to

112. See RICHARD H THALER & CASS R SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 7 (Penguin, 2009).

113. Marvin Goodfriend, *Overcoming the Zero Bound on Interest Rate Policy*, *JOURNAL OF MONEY, CREDIT AND BANKING* 1007, 1007 (2000).

114. Dwight Jaffee & Joseph Stiglitz, *Credit Rationing*, 2 *HANDBOOK OF MONETARY ECONOMICS* (1990); Joseph E Stiglitz & Andrew Weiss, *Banks as Social Accountants and Screening Devices for the Allocation of Credit* (National Bureau of Economic Research Cambridge, Mass., USA 1988); Marco Raberto et al., *From Financial Instability to Green Finance: the Role of Banking and Credit Market Regulation in the Eurace Model*, 29 *J. OF EVOLUTIONARY ECON.* 429, 430 (2019).

115. See Hersh Shefrin & Meir Statman, *Behavioral Finance in the Financial Crisis: Market Efficiency, Minsky, and Keynes*, *SANTA CLARA UNIV.* 1, 24 (2011); Hersh Shefrin & Meir Statman, *Behavioral Finance in the Financial Crisis: Market Efficiency, Minsky, and Keynes*, *SANTA CLARA UNIV.* 1, 3 (2011).

116. Hyman P Minsky, *The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to "Standard" Theory*, 20 *CHALLENGE* 20, 25 (1977).

117. Annina Kaltenbrunner & Elif Karacimen, *The Contested Nature of Financialization in Emerging Capitalist Economies*, in *THE GREAT FINANCIAL MELTDOWN* (2016).

118. Minsky, *CHALLENGE* 25 (1977).

119. See Yeon-Koo Che & Rajiv Sethi, *Credit Market Speculation and the Cost of Capital*, 6 *AM. ECON. J.: MICROECONOMICS* 1, 2 (2014); Minsky, *CHALLENGE* 25 (1977).

service its debt.¹²⁰ People using money are not fully economically rational.¹²¹ They are imperfectly rational, and political.¹²² Additionally, the value of money is a signal of people's trust in it at a point in the business cycle.¹²³ Money users can have divergent and adaptive expectations of the value of money, which affects the price of money.¹²⁴ These users need to be clear about the value stability mechanism of the money they hold so that they can make future plans accordingly.

Therefore, stablecoin issuers should be responsible for the claims and commitments they make and disclose their mechanism of keeping the value of their monetary instruments. The disclosed document is also useful for consumer education.¹²⁵ Consumer education can be seen as an elementary part of promoting financial inclusion—providing individuals, households, and firms affordable, timely, and adequate access to financial services.¹²⁶ Financial consumers need knowledge about financial products and services so that they can make rational decisions about payment and investment. Furthermore, disclosure documents for public access are useful for enhancing the financial and technological literacy of consumers.¹²⁷ A cognitive basis for the development of private money is that consumers clearly understand the value and purpose of the money. So long as the information signals spread in the market are clear and authentic, financial consumers can be allowed to freely choose the kind of money they would like to use and store.

120. See Robert F. Mulligan, *A Sectoral Analysis of the Financial Instability Hypothesis*, 53 Q. REV. ECON. AND FIN. 450, 458 (2013).

121. Cass R. Sunstein, *The Storrs Lectures: Behavioral Economics and Paternalism*, 122 YALE L. J. 1826, 1870 (2012).

122. *Id.* at 1839.

123. See James H. Stock & Mark W. Watson, *Has the Business Cycle Changed and Why?*, 17 NBER MACROECONOMICS ANNUAL 159, 160 (2002); THOMAS F. COOLEY & EDWARD C. PRESCOTT, *FRONTIERS OF BUSINESS CYCLE RESEARCH* 3-4 (Princeton University Press Princeton, NJ, 1995).

124. Robert J. Barro, *Rational Expectations and the Role of Monetary Policy*, 2 J. OF MONETARY ECON. 1, 1 (1976).

125. Taejun Lee, et al., *What You Think You Know: The Effects of Prior Financial Education and Readability on Financial Disclosure Processing*, 18 JOURNAL OF BEHAVIORAL FIN. 125, 125 (2017).

126. Deepika Bhatia & Jivan Kumar Chowdhury, *Extent of Financial Inclusion: A Literature Review*, 7 ASIAN J. RSCH. BANKING & FIN. 76, 77 (2017).

127. See Lee et al., *supra* note 125, at 163.

C. Financial Stability

The financial market has inherent instability tendencies, especially given the existence of the business cycle and the contagion effect of the market sentiment and transactions.¹²⁸ Monetary stability and flexibility vary in different periods of a business cycle (the recurrent pattern of expansion, peak, contraction and trough in economic activity over time).¹²⁹ In each different period, the demand for money, the behavior of economic agents, and the policy response can influence the level of monetary stability and flexibility. This variation also arises from the pressure of other currencies and financial assets from domestic and international environments.¹³⁰ Financial contagion refers to a situation where a shock that initially affects only a few financial institutions spreads to the rest of the financial system and the economy.¹³¹

To enhance their liquidity, stablecoins are designed to be fungible,¹³² giving up the potential advantages and disadvantages of specificity. The fungibility of stablecoin saves the efforts of checking the ownership of money and the validity of previous transactions. Otherwise stated, stablecoin claims are equivalently interchangeable with each other.¹³³ All stablecoin claims

128. Hyman P Minsky, *The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to "Standard" Theory*, 20 CHALLENGE 20, 22 (1977).

129. See Bruce Champ et al., *Currency Elasticity and Banking Panics: Theory and Evidence*, 29 CANADIAN J. ECON. 829, 831–44 (1996); Robert E. Lucas, Jr., *Monetary Neutrality*, in NOBEL LECTURES, ECON. 1991-1995 246, 256 (Torsten Persson ed., 1997).

130. See PHILIP COGGAN, PAPER PROMISES: DEBT, MONEY AND THE NEW WORLD ORDER 114, 116 (2011).

131. See Erlend Nier et al., *Network Models and Financial Stability* 1, 14 (Bank of England, Working Paper No. 346, 2007); Franklin Allen & Douglas Gale, *Financial Contagion*, 108 J. POL. ECON. 1, 2 (2000); Matt Pritsker, *The Channels for Financial Contagion*, in INTERNATIONAL FINANCIAL CONTAGION 67, 67 (S. Claessens et al. eds., 2001).

132. Fungibility means money can be exchanged or substituted for each other so long as these money are of the same type (usually the same unit of account and/or existing form). In the legal sense, monetary debts are paid off with any unit of money so long as the amount is equivalent, regardless of which specific unit of money is used.

133. See *The difference between stablecoins and other digital assets - The Complete Guide to Stablecoins*, ROOTSTOCK, <https://developers.rsk.co/guides/stablecoin/stablecoin-vs-digital->

are mathematical operations of quantitative values. This mathematical equivalence allows for an interoperable payment system, settling financial transactions through the transfer of monetary value or other means of settlement. Nevertheless, the mathematical equivalence of debt arguably disturbs the wider scope of creditor equality on insolvency and proprietary interests in money. Homogeneous money clouds the specificity of relations and commodities.¹³⁴ This homogeneity of money is the root cause of many failures of debt repayment and allows for the transmission of monetary failure to other sectors in a wider area.¹³⁵ Further, many stablecoin issuers involve huge amounts of assets.¹³⁶ Tether's commercial paper holdings reached US\$70 billion in October 2021, larger than those of the most prime money market funds in the United States (US) and the European Union.¹³⁷ A sudden mass redemption of Tether could affect the stability of short-term credit markets, or cause runs in cases of major cyber-attack or loss of market confidence.

The prices of financial assets are characterized by excessive volatility or price movements.¹³⁸ This is because the prices of financial assets are determined by a variety of factors, such as supply and demand, market sentiment, macroeconomic indicators (GDP, inflation rate, interest rate), reports and newspapers, and policies and regulations. The prospect theory suggests that the value function outweighs the expected utility function whereas probabilities are replaced by decision weight, hence value is assigned to gains and losses.¹³⁹ Cognitive scientists have discovered that the emergence of a speculative bubble is not the

assets/#:~:text=A%20stable-coin%20is%20a%20type,the%20Euro%2C%20and%20other%20asset (last visited June 14, 2023).

134. See Michel Aglietta, *Whence and Whither Money?*, in *THE FUTURE OF MONEY* 31, 33 (2002).

135. Matteo Mandarini, *Marx and Deleuze: Money, Time, and Crisis*, 18 *POLYGRAPH: AN INTERNATIONAL JOURNAL OF CULTURE AND POLITICS* 73, 78 (2006).

136. See Garth Baughman et al., *The stable in stablecoins*, FEDS NOTES (Dec. 16, 2022), <https://www.federalreserve.gov/econres/notes/feds-notes/the-stable-in-stablecoins-20221216.html>.

137. See Lucien Rapp & Maria Topka, *Small Satellite Constellations, Infrastructure Shift and Space Market Regulation*, *LEGAL ASPECTS AROUND SATELLITE CONSTELLATIONS* 1, 2 (2021).

138. See ROBERT J. SHILLER, *MARKET VOLATILITY* 1–2 (1992).

139. Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision under Risk* 47 *ECONOMETRICA* 263, 264 (1979).

consequence of the sudden irrationality of the investors, but slight modifications in the individual's level of confidence in the group opinion.¹⁴⁰ These systematic biases may have positive feedback dynamics that contribute to the formation of speculative bubbles.¹⁴¹ The volatile price and trading volume showed that cryptocurrency has mainly been used as a speculative investment other than an alternative currency or medium of exchange.¹⁴² Stablecoins, and more generally other cryptocurrencies, are formally or informally linked to other types of money through reserve, redemption, settlement, or insurance.¹⁴³ As the volatile price of cryptocurrencies may transfer to other monetary instruments, transmission channels must be regulated to prevent the system from falling while protecting the liquidity of these currencies at a fair level.¹⁴⁴

The volatile price of stablecoins may risk market instability at the expense of those who should neither undertake nor be responsible for the potential loss. The digital feature of algorithmic stablecoin further creates network effects and potential contagion.¹⁴⁵ As this digital manifestation and operation of stablecoins enhance the accessibility and availability of money and financial services, they change the market patterns different from those

140. NATHALIE LAZARIC & EDWARD H. LORENZ, *TRUST AND ECONOMIC LEARNING* 136 (Edward Elgar ed. 1998).

141. ROBERT Z. ALIBER & CHARLES POOR KINDLEBERGER, *MANIAS, PANICS, AND CRASHES: A HISTORY OF FINANCIAL CRISES* 41 (6th ed. 2011).

142. John Fry, *Booms, Busts and Heavy-tails: The Story of Bitcoin and Cryptocurrency Markets?* 171 *ECON. LETTERS* 225, 225 (2018); John Fry & Eng-Tuck Cheah, 'Negative Bubbles and Shocks in Cryptocurrency Markets', 47 *INT'L REV. OF FIN. ANALYSIS* 343, 343 (2016); Eng-Tuck Cheah & John Fry, *Speculative Bubbles in Bitcoin Markets? An Empirical Investigation into the Fundamental Value of Bitcoin*, 130 *ECON. LETTERS* 32, 32 (2015).

143. Sarah Jane Hughes & Stephen T Middlebrook, *Advancing a Framework for Regulating Cryptocurrency Payments Intermediaries*, 32 *YALE J. ON REG.* 495, 497 (2015); Anton N Didenko & Ross P. Buckley, *The Evolution of Currency: Cash to Cryptos to Sovereign Digital Currencies*, 42 *FORDHAM INT'L L. J.* 1054, 1054 (2018).

144. Dirk A. Zetzscheet et al., *Regulating Libra*, 41 *OXFORD J. LEGAL STUD.* 80, 80 (2020); Dennis Chu, 'Broker-dealers for Virtual Currency: Regulating Cryptocurrency Wallets and Exchanges', 118 *COLUM. L. REV.* 23, 23 (2018).

145. ARIAH KLAGES-MUNDT ET AL., *STABLECOINS 2.0: ECONOMIC FOUNDATIONS AND RISK-BASED MODELS* 1, 3 (2020).

of physical notes and bank deposits.¹⁴⁶ Research found that the price of cryptocurrencies is dynamic according to users' adoption and network structure.¹⁴⁷ Research based on a dynamic asset pricing model of cryptocurrencies found that instead of discounting cash flows like standard valuation models, the price of tokens is established by combining the transactional demand of diverse users and the supply from the platform.¹⁴⁸ The process of endogenous platform adoption relies on user network externality and follows an S-curve: it begins with a slow start, gains volatility, and eventually levels off.¹⁴⁹ The intrinsic user base plays a vital role in elucidating the variation of token pricing across different sections, the dynamics of token price volatility, and the run-up and fall of token prices.¹⁵⁰ If the token supply is endogenous, the commitment to some monetary rules could be used to maximize the expected value of the venture.¹⁵¹ The key assumption that the token market is fully liquid, however, can be less credible in reality. The token market can be illiquid at the early stages of platform adoption, including wash trading.¹⁵² Price manipulation and effects of cryptocurrency are more subtle than that of traditional fiat money and bank money.

D. Information Infrastructure

Full and accurate disclosure is the foundation of any regulatory activity.¹⁵³ Regulators need to understand the market situation and formulate rules corresponding to the problems. One key premise of financial regulation and policymaking is an understanding of market conditions and complexities. One of the reasons for the difficulty in formulating regulations for

146. Alexander Lipton et al., *Stablecoins, Digital Currency, and the Future of Money*, BUILDING THE NEW ECON. (Apr. 30, 2020), <https://wip.mitpress.mit.edu/pub/17h9tjq7>.

147. Lin William Cong et al., *Tokenomics: Dynamic Adoption and Valuation*, 34 REV. FIN. STUD. 1105, 1106 (2021).

148. Lin William Cong et al., *Token-based Platform Finance*, J. OF FIN. ECON. 972, 972 (2021).

149. Cong, et al., RE. OF FIN. STU. (2021).

150. *Id.*

151. *Id.* at 7.

152. Lin William Cong et al., *Crypto Wash Trading ii* (Bureau of Econ. Rsch., Working Paper No. 30783, 2022).

153. Oonagh B. Breen, *The Disclosure Panacea: A Comparative Perspective on Charity Financial Reporting*, 24 VOLUNTAS: INT'L J. OF VOLUNTARY & NONPROFIT ORG. 852, 855 (2013).

stablecoins is that regulators are not clear about the consequences and influences of stablecoins and other private money.¹⁵⁴ Practically, there is a huge information and knowledge gap in the understanding of stablecoins between their issuer and the regulator.¹⁵⁵ Regulators know little about the quantity, value, number of users, capital scale, and connection to other financial assets, and thus find it difficult to identify emerging risks of currency depreciation and the tendency of a market run.¹⁵⁶ Continuous risk assessment is necessary to identify risks and business models that may require updating regulations to ensure effective protection of consumers, market integrity, and financial stability.¹⁵⁷ Except for traditional regulatory reporting, regulators may consider using supervisory technology like web scraping, and consumer and market surveys for more efficient and effective information collection.¹⁵⁸

Along with the decentralization of stablecoins is the decentralization of information and digital infrastructure—information content and format are heterogeneous and fragmented.¹⁵⁹ Decentralized knowledge distribution is certainly an inherent feature of the market,¹⁶⁰ but this does not mean that centralized information collection and standardized disclosure formats are

154. Chenzi Hu & He Yang, *Real Effects of Stabilizing Private Money Creation* 1, 6 (Nat'l Bureau of Econ. Rsch., Working Paper No. 30060, 2022); Nenad Tomić, et al., *The Potential Effects of Cryptocurrencies on Monetary Policy*, 17 EUR. J. APPLIED ECON 37, 45-46 (2020); ECB Crypto Assets Task Force, *Stablecoins: Implications for Monetary Policy, Financial Stability, Market Infrastructure and Payments, and Banking Supervision in the Euro Area* 8-10 (Eur. Cent. Bank, Occasional Paper Series No. 247, 2020).

155. Agata Ferreira & Philipp Sandner, *Eu Search for Regulatory Answers to Crypto Assets and Their Place in the Financial Markets' Infrastructure*, 43 COMPUTER L. & SEC. REV. 1, 2 (2021).

156. See generally Rudiger Dornbusch et al., *Contagion: How It Spreads and How It Can Be Stopped*, 15 WORLD BANK RSCH. OBSERVER 177, 178 (2000).

157. Andrew Hiles, *Enterprise Risk Management*, in THE DEFINITIVE HANDBOOK OF BUSINESS CONTINUITY MANAGEMENT 3, 4 8-9 (Andrew Hiles ed., 2010).

158. See generally Ioannis Anagnostopoulos, *Fintech and Regtech: Impact on Regulators and Banks*, 100 J. ECON. & BUS. 7, 7 (2018); see also Simone Di Castri et al., *The Suptech Generations*, 19 Fin. Stability Inst. Insights 1, 3, 11 (2019)

159. Narinder Singh, *Unifying Heterogeneous Information Models*, 41 COMM. OF THE ACM 37, 38-39 (1998).

160. See Frederick A Hayek, *The Use of Knowledge in Society*, in KNOWLEDGE MANAGEMENT AND ORGANIZATIONAL DESIGN 7, 7-8 (Paul S. Myers ed., 2009).

meaningless. Instead, with the availability of big data, it is necessary to establish a comprehensive information infrastructure for data processing and analytics. Infrastructure is conventionally understood as a variety of pervasive, enabling network resources such as railroad lines, plumbing and pipes, electrical power plants, and wires.¹⁶¹ Information infrastructure can broadly include computational services, help desks, data depositories, bulletin boards, or archives needed to address important social issues.¹⁶² It is a way of knowing and understanding in a networked environment,¹⁶³ especially the money and financial system.

In an increasingly complex information society, the functions of government and regulators should change. Specifically, they should focus more on the construction of infrastructures, such as the registration of stablecoin issuers and distributors, and platforms for information disclosure, query, and supervision. The construction and operation of these projects will largely involve both public and private participation.¹⁶⁴ The construction of regulatory infrastructure will leave more business options and innovation opportunities to the market, rather than direct prohibition or restriction. With uniform and clear information standards, the market will make strategic and rational choices accordingly, and only the most reliable and sustainable financial products will survive.

III. THE ISSUER'S DISCLOSURE CONTENTS

Good disclosure should help consumers find what they need, understand what they find, and use what they find to make informed transaction decisions. This regulatory strategy is very much like the reporting and registration regime under the US Securities and Exchange Commission (SEC) rules. Accordingly, stablecoin issuers are expected to disclose their developers, objectives, technological complexities, key personnel and governance structure, beneficiaries, risks, and other important

161. Geoffrey C. Bowker et al., *Toward Information Infrastructure Studies: Ways of Knowing in a Networked Environment*, in INT'L HANDBOOK OF INTERNET RSCH. 97, 97 (2009).

162. *Id.* at 98.

163. *Id.* at 97.

164. Micahel B. Gerrard, *Public-private Partnerships*, 38 FIN. & DEV. 83, 83 (2001); Rhys Andrews & Tom Entwistle, *Public-private Partnerships, Management Capacity and Public Service Efficiency*, 43 POL'Y & POL. 273, 290 (2015).

information that affects consumers' transaction decisions.¹⁶⁵ This includes three main aspects: (1) qualifications of the issuer; (2) stablecoin price, quantity, and risk factors; (3) transaction rules and fees.

A. The Issuer's Qualification

1. Governance body and beneficiaries.

The issuer needs to disclose the existence of a governance body. The governance body can be traditional senior management such as directors, executive officers, control persons, beneficial owners, or other equivalents that possess the same governance power and discretion in the issuance and operation of the stablecoin. The issuer must disclose any ownership and transactions in the issuer's stablecoins by these individuals. The issuer should also disclose holders of tokens above a certain amount or tokens with specific governance rights. Optional disclosure includes corporate governance matters, such as director independence, the composition of the audit committee, compensation committee, nominating committee, and any other committees.

2. Financial statement and reserve assets.

Stablecoin is the debt of its issuer. The price of stablecoins could be anchored to the solvency of the issuer who is legally liable to repay the debts. The purpose of this disclosure is to maintain the stability of the stablecoin issuer's capital adequacy and liquidity. Stablecoin issuers must disclose financial statements that convey the business activities and financial performance of the company. These include the balance sheet, income statement, statement of cash flow, and statement of changes in equity.

Stablecoin issuers should also disclose information about the kind and amount of reserve assets, whether these assets are segregated or pooled, and where these assets are stored or deposited. This will help consumers determine how reliable the stablecoin is. Stablecoin issuers should provide regular (monthly or quarterly) disclosure of the assets backing the stablecoin and their respective values. This disclosure serves as a supervision

165. Chris Brummer, *Disclosure, Dapps and DeFi*, FORTHCOMING, STA J. BLOCKCHAIN L. & POL'Y (forthcoming Mar. 2022) (manuscript at 17–18) (on file with authors).

mechanism to guarantee that the issuer will have the ability to redeem all outstanding payment stablecoins at par in legal tender. Otherwise, regulators can require “proof of solvency” to ensure that the assets of the platform exceed its liabilities.¹⁶⁶

In the future, stablecoins issuers may be required to observe some prudential requirements, whether it be an actional reserve banking model or a non-bank money transmitter model.¹⁶⁷ Issuers of payment stablecoins may be required to maintain reserves of high-quality liquid assets valued at 100 percent of the face value of all outstanding payment stablecoins. Stablecoins issuers may be regulated for the kind of assets they can hold (capital reserves requirements), and the kind and amount of money (debt) they can issue (credit extension requirements). In the case of insured depository institutions that engage in on-balance sheet lending activities, these reserve assets should be held at a federal reserve bank or a foreign central bank.

3. Business strategy and investment plan.

The regulatory contradiction of stablecoins as private money is that, on the one hand, stablecoins are not as trustworthy as regulated banks or depository institutions, and thus they exhibit risks similar to securities.¹⁶⁸ Such risk calls for information disclosure to facilitate market supervision and regulatory oversight. On the other hand, the issuer risk of stablecoins is not the same as the market and credit risks of securities issuers, because the purpose of stablecoins is not an investment product, but a payment means that has a stable value.¹⁶⁹

To protect consumers and shape the knowledge base for further regulation, stablecoin issuers should disclose their business strategy and investment policies. Issuers can decide, in their judgment, what decisions and developments are material to an

166. Gaby G. Dagher et al., *Provisions: Privacy-preserving Proofs of Solvency for Bitcoin Exchanges*, Int'l Assoc. for Cryptologic Rsch., Oct. 2017, at 1, 5; Panagiotis Chatzigiannis et al., *SoK: Auditability and Accountability in Distributed Payment Systems*, Int'l Assoc. for Cryptologic Rsch. June 2021, at 1, 6.

167. Gary B Gorton & Jeffery Zhang, *Taming Wildcat Stablecoins*, 90 UNIV. OF CHICAGO L. REV. 909, 913 (2022).

168. See Alexander Lipton et al., *Building the New Economy*, MIT PRESS WORKS IN PROGRESS, <https://wip.mitpress.mit.edu/pub/17h9tjq7> (last visited Apr. 30, 2020, 8:26 AM).

169. Franklin Allen, et al., *Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China*, 1– 30 (Fed. Res. Bank of Philadelphia, Working Paper No. 22-12, 2022).

understanding of the business. Where the information is material to investors' understanding of the business, the issuer should disclose a company's human capital resources in managing the business, the nature of the business and workforce, and measures that address the development, attraction, and retention of personnel and economic resources. Common business disclosure includes revenue-generating activities, products and services, resources material to an issuer's business, material effects of compliance with government regulations on capital expenditures, earnings, and competitive positions.

Like banks, stablecoin issuers may be restricted from doing business in geographical areas outside their home country or entering businesses unrelated to banking. If these requirements are imposed on stablecoin issuers, they should disclose their business strategy and investment plan. The implementation of these policies may be audited by outside experts like auditors, bankers, and lawyers. It is very likely that stablecoin issuers shall disclose "material changes" in their businesses, like the current reports on SEC Form 8-K. The main standard of disclosure is the scale of stablecoins issuance, considering the social impact and the risks concerned. Based on the definition of a reporting company under Section 12 of the 1934 Securities Exchange Act, a stablecoin issuer will have to report if its total assets and stablecoins issued exceed a certain amount and are held by a certain number of persons.

B. Information of Stablecoins

1. Purpose of the stablecoin and technologies used.

Stablecoin is not a legal concept, nor does it have a consistent conceptual consensus formed in commercial practice. Stablecoin issuers must state the purpose of their stablecoins, whether it be payment, currency exchange, investment, or wealth management. They should disclose the technologies used to serve the social economic function, and the hardware and software used for stablecoin issuance and redemption. Stablecoin issuers should also provide notice regarding material source code changes.

2. Price stabilization mechanism.

One focus of stablecoin is its value or price, which claims to be maintained by some stabilization mechanism.¹⁷⁰ The statement of their price maintenance mechanism must be accountable, meaning that the issuer must follow certain monetary and financial principles. The issue of private money issuance is not only a political decision of who has the power to issue it, but also a scientific and professional task for the maintenance of the currency system. The following discussion of the monetary stability mechanism will demonstrate why issuers are obliged to explain the mechanisms and rationale for maintaining price stability.

i. Exchange rate

As a medium of exchange, the value of money is measured in exchange for different things, such as goods, services, foreign currencies, or other valuable assets. Most stablecoins claim to have a fixed exchange rate with one or more fiat currencies.¹⁷¹ Few stablecoins claim purchasing power stability, and this avoidance makes sense given the complexity of the macroeconomy.

While the declaration of a fixed exchange rate seems simple, there is a complex maintenance rationale. Historically, money used to be anchored to credible things—gold and other valuable assets.¹⁷² This strategy has been widely adopted in monetary policies and financial regulations across the world.¹⁷³ Under the gold standard, the currency's link to gold guarantees a fixed exchange rate between gold and the currency.¹⁷⁴ Gold serves as the

170. See Christian Catalini et al., *supra* note 22, at 22.

171. What Keeps Stablecoins Stable? (2020) https://www.newyorkfed.org/medialibrary/media/research/conference/2022/fintech/NYFed_September2022_Ganesh.pdf?sc_lang=en&hash=6E92F11CE0D0D3D38F8D3E64D91C00AE#:~:text=What%20Keeps%20Stablecoins%20Stable%3F,-Richard%20K%20Lyons1&text=Stablecoins%20operate%20on%20the%20blockchain,backed%2C%20with%20the%20former%20predominating.&text=Alternative%20payments%3A%20Remittance%20and%20cross%2Dborder%20payments.

172. Robert J. Barro, *Money and the Price Level under the Gold Standard*, 89 THE ECON. J. 13, 13 (1979).

173. Richard Sylla, *Political Economy of Supplying Money to a Growing Economy: Monetary Regimes and the Search for an Anchor to Stabilize the Value of Money*, 11 THEORETICAL INQUIRIES IN L. 1, 6 (2010).

174. Samuel Knafo, *The Gold Standard and the Origins of the Modern International Monetary System*, 13 REV. INT'L POL. ECON. 78, 81 (2006).

authentic nominal anchor.¹⁷⁵ The state guarantees the value of fiat money with precious metal standard or pure trust, enhances the convertibility and acceptability of money by assigning the nominal value of a coin or banknote,¹⁷⁶ stipulating its currency as legal tender,¹⁷⁷ and designating reserve assets.¹⁷⁸

The gold standard can be seen as the prototype of the modern exchange rate. On the one hand, banknotes remain at par value, based on the idea of cash nominalism.¹⁷⁹ On the other, under the classical gold standard, the value of banknotes was expressed in terms of their gold “content” (the objective to maintain a constant gold content or value in the currency), which central banks attempted to maintain at stated levels over time.¹⁸⁰ A fixed exchange rate means that the two types of money are kept in equilibrium, where one money supply is related to the balance of the other.

The contemporary foreign exchange market and the determination of exchange rates based on national interest rates and expectations hold a central position of open-economy macroeconomics.¹⁸¹ The relevant economic debate is whether exchange rates behave consistently with asset-pricing models,¹⁸² which are relevant to economic fundamentals such as the money supply, trade balance, and national income, or exchange rates are not predictable as macroeconomic models cannot generally beat random walk (a financial economic concept that suggests the future movements of exchange rates are unpredictable and follow a random pattern),¹⁸³ at least over short and medium term.

175. FORREST CAPIE ET AL., *THE FUTURE OF CENTRAL BANKING* 1, 1 (1994).

176. CHRISTINE DESAN, *MAKING MONEY: COIN, CURRENCY, AND THE COMING OF CAPITALISM* 30–32 (2014).

177. BANK OF ENGLAND, *What Is Legal Tender?*, <https://www.bankofengland.co.uk/knowledgebank/what-is-legal-tender> (last updated Jan. 30, 2020).

178. Michael Sproul, *Backed Money, Fiat Money, and the Real Bills Doctrine*, at 6 (Univ. Cal., Working Paper No. 774B, 1998).

179. See generally David Fox, *The Case of Mixed Monies: Confirming Nominalism in the Common Law of Monetary Obligations*, 70 *CAMBRIDGE L. J.* 144, 174 (2011).

180. See generally Arthur Nussbaum, *The Legal Status of Gold*, 3 *AM. J. COMPAR. L.* 360 (1954).

181. PAUL R. KRUGMAN, *INTERNATIONAL ECONOMICS: THEORY & POLICY* (Mauro Obstfeld & Marc J. Melitz eds., 11th ed., 2018) xxiv.

182. Charles Engel & Kenneth D. West, *Exchange Rates and Fundamentals*, 113 *J. POL. ECON.* 485, 513 (2005).

183. Richard A. Meese & Kenneth Rogoff, *Empirical Exchange Rate Models of the Seventies: Do They Fit out of Sample?*, 14 *J. INT'L ECON.* 3, 24 (1983).

Exchange rates exhibit no discernible pattern or trend and cannot be reliably predicted based on past price movements or fundamental economic variables. An eclectic conclusion is that economic fundamentals are not very helpful in forecasting exchange rates, at least no better than a random walk, even if currency values are determined by these fundamentals.

A fixed exchange rate is often challenged by a flexible exchange rate.¹⁸⁴ We are accustomed to associating national currencies with the currencies of major countries, whose value and credibility are derived from the wide range of goods, services, and assets available in their national economies. However, for small and specialized countries, their national currencies lack utility in this sense and often derive their value and credibility from the fixed-price convertibility into major currencies. These target sovereign currency countries are usually the ones with which the small country engages in extensive trade and investment.¹⁸⁵ In the case of small and specialized countries, the rigid convertibility of their currency plays a more significant role in facilitating international trade and investment, outweighing the potential benefits that could come from exchange rate flexibility.¹⁸⁶

ii. Reserve assets

Commercial banks create money by issuing deposits and lending credits.¹⁸⁷ Bank deposits held at an insured depository institution are a claim on the issuing bank that provides the depositor with the right to receive US dollars upon request. The value of this claim is insured up to certain amounts and entitled to depositor preference in resolution.¹⁸⁸

In order to increase their liquidity provision and generate money for themselves and others, banks systematically and

184. Andrew K. Rose, *Exchange Rate Regimes in the Modern Era: Fixed, Floating, and Flaky*, 49 J. ECON. LITERATURE 652, 655 (2011).

185. Harry G Johnson, *The Case for Flexible Exchange Rates, 1969*, FED. RSRV. BANK ST. LOUIS REV. 12, 24. (1969).

186. *Id.*

187. See generally Richard A. Werner, *A Lost Century in Economics: Three Theories of Banking and the Conclusive Evidence*, 46 INT'L REVIEW OF FIN. ANALYSIS 1, 19 (2016).

188. M. Kabir Hassan et al., *Deposit Insurance, Market Discipline and Off-balance Sheet Banking Risk of Large US Commercial Banks*, 18 J. BANKING & FIN. 1 (1991).

consistently utilize their market position to acquire debt-related raw materials, allowing them to establish their financial dominance.¹⁸⁹ Banks fund themselves with short-term debt.¹⁹⁰ With sufficient collateral backing it, the short-term debt can be made into riskless money, which, because of the transaction services it generates, represents a cheap source of finance for banks.¹⁹¹ The concern is that banks' private incentives lead them to overuse this method, since they do not fully internalize the fire-sale costs that are by-products of their maturity transformation.¹⁹² The externality associated with excessive money creation provides a fundamental rationale for financial stability regulation and arguably, the existence of central banks.¹⁹³

To restrict the bank money supply, some measures are often adopted to control the amount of money in circulation. These include reserve requirements on external liabilities, prohibitions on acceptance of external deposits in either domestic or foreign currency, a ceiling on gross or net external liabilities, conversion limits from foreign to domestic currency, matching regulations for balancing external assets and liabilities, restrictions on repatriation of external assets, control of term structure of external liabilities, penalties on excess external liabilities, and instructions to repay external liabilities, freeze on external liabilities over a specified amount, and control over transfer to external accounts.¹⁹⁴

The Gold Era in the late 1870s, when banknotes and deposits were convertible to gold and silver, can be understood as the origin of modern bank reserves.¹⁹⁵ The Palmer Rule in Spain

189. Stefano Sgambati, *The Art of Leverage: A Study of Bank Power, Money-making and Debt Finance*, 26 REV. INT'L POL. ECON. 1, 5 (2019).

190. Douglas W Diamond & Raghuram G Rajan, *Banks, Short-term Debt and Financial Crises: Theory, Policy Implications and Applications* 54 CARNEGIE-ROCHESTER CONF. SERIES ON PUB. POL. 37, 74 (2001).

191. Dani Rodrik & Andres Velasco, *Short-term Capital Flows* (Nat'l Bureau of Econ. Rsch., Working Paper No. 7364, 1999).

192. Viral V. Acharya & S. Viswanathan, *Leverage, Moral Hazard, and Liquidity*, 66 J. FIN. 1, 39 (2011).

193. Jeremy C. Stein, *Monetary Policy As Financial Stability Regulation*, 127 Q. J. ECON. 57, 60 (2012).

194. Eugene F. Fama, *What's Different about Banks?*, 15 J. MONETARY ECON. 29, 30 (1985); Thomas I. Palley, *Asset-based Reserve Requirements: Reasserting Domestic Monetary Control in an Era of Financial Innovation and Instability*, 16 REV. POL. ECON. 43, 58 (2004).

195. Knafo, *supra* note 174, at 80.

established a minimum ratio of reserves of 33 percent, calculated as reserves divided by banknotes and deposits.¹⁹⁶ Spanish legislation set up the ratio of reserves only about notes, lower than that required for notes and sight deposits.¹⁹⁷ The gold standard limits the power of governments and banks to cause price inflation by excessive issuance of paper currency, although there is evidence that even before World War I monetary authorities did not contract the supply of money when the country incurred a gold outflow.¹⁹⁸ It also creates certainty in international trade by providing a fixed pattern of exchange rates.¹⁹⁹

Government bonds and central bank reserves, when used as collateral for banks to issue banknotes and deposits, serve the same function as gold or silver to back up the validity of bank money. Central bank reserves are created by the central bank to facilitate payments between commercial banks.²⁰⁰ The standard method by which the central bank creates reserves is through a sale and repurchase agreement, similar to a collateralized loan.²⁰¹ The commercial bank sells an interest in an asset to the central bank in exchange for central bank reserves, while agreeing to repurchase its interest in the said asset for a specific higher price on a specific future date.²⁰² If banks demand more reserves in order to accommodate burgeoning loan demand, the central bank should provide the needed reserves but at a discount rate that is higher than other short-term interest rates.²⁰³

196. Anders Ögren & Lars Fredrik Øksendal, *The Euro and the Gold Standard: What Are the Lessons*, THE GOLD STANDARD PERIPHERIES (2011).

197. *Id.*

198. *Gold Standard Monetary System*, BRITANNICA, <https://www.britannica.com/topic/gold-standard> (last updated Mar. 24, 2023)

199. *Id.*

200. Wei Shen & Liyang Hou, *China's Central Bank Digital Currency and Its Impacts on Monetary Policy and Payment Competition: Game Changer or Regulatory Toolkit?*, 41 COMPUTER L. & SEC. REV. 1, 2 (2021).

See Marvin Goodfriend, *Central Banking in the Credit Turmoil: An Assessment of Federal Reserve Practice*, 58 J. MONETARY ECON. 1, 11 (2011).

202. *How Central Banks Create Money*, POSITIVE MONEY, <https://positivemoney.org/how-money-works/advanced/how-central-banks-create-money/> (last visited June 14, 2023).

203. See FRANCO MODIGLIANI & HOSSEIN ASKARI, THE REFORM OF THE INTERNATIONAL PAYMENTS SYSTEM 21 (International Finance Section, Department of Economics, Prince University, ed., 1971); see also Paul Tucker, Exec. Dir. and Member, Monetary Pol'y Comm. Bank Eng., *Managing the Central Bank's Balance Sheet: Where Monetary Policy Meets Financial Stability*, To

By controlling the rate of interest paid on central bank reserves and the interest rate the central bank charges banks to borrow in an emergency, the central bank creates a corridor around its desired policy interest rate. This corridor allows the central bank to set the interest rate at which banks lend to each other on the interbank market.²⁰⁴ With ample liquidities, the rate of central bank reserves will help eliminate the opportunity costs of holding reserves and enable banks to hold larger buffers of reserves.²⁰⁵

Some central banks create money with monetary policy instruments such as open market operations, the discount rate, and reserve requirements.²⁰⁶ Open market operations involve the buying and selling of government securities.²⁰⁷ The discount rate is the interest rate charged by central banks to depository institutions on short-term loans.²⁰⁸ Reserve requirements are the portions of deposits that banks must maintain either in their vaults or on deposit at the central bank.²⁰⁹

Reserve requirements on banks preserve the value of bank money by connecting it with government money. A capital buffer for a bank's balance sheet refers to extra assets on the balance sheet that are not associated with liabilities.²¹⁰ Such a buffer, typically in the form of capital reserve requirements, can absorb unexpected losses.²¹¹ Reserve assets typically include cash or cash equivalents and short-term government securities.²¹² According to the European Central Bank, central bank reserves refer to the overnight balances held by banks in an account at the central bank.²¹³ Central bank reserves are the most liquid and

mark the fifteenth anniversary of Lombard Street Research held in London, in *BANK ENG. Q. BULL.* (2004).

204. PONTUS ÅBERG, ET AL., *DEMAND FOR CENTRAL BANK RESERVES AND MONETARY POLICY IMPLEMENTATION FRAMEWORKS: THE CASE OF THE EUROSISTEM 8* (2021).

205. *Id.* at 207.

206. Joshua N Feinman, *Reserve Requirements: History, Current Practice, and Potential Reform*, 79 *FED. RESERVE BULL.* 569, 569 (1993).

207. *See id.* at 584–85.

208. *See id.* at 574.

209. *Id.* at 570.

210. Tobias Adrian & Hyun Song Shin, *Financial Intermediaries and Monetary Economics*, in *HANDBOOK OF MONETARY ECONOMICS* 19 (2010).

211. *Id.*

212. *Id.* at 61.

213. Åberg, *supra* note 204, at 3.

risk-free assets available in the financial system.²¹⁴ The central bank supplies funds or liquidities to banks through its open market operations and discount window lending.²¹⁵ The principal tool is an open market operation in which the Federal Reserve buys or sells government securities in the secondary market to add or drain banking system reserves.²¹⁶ The demand for central bank reserves is influenced by banks' business models and financial market activities, their risk tolerance level, and the extent of fragmentation in money markets.²¹⁷ The central bank sets the terms and conditions at which it provides reserves when conducting its monetary policy.²¹⁸ Beyond reserve assets, bank money is backed by deposit insurance and lender of last resort²¹⁹ support from the central bank.²²⁰

Despite the gold standard, the value of the currency can fluctuate in purchasing power measured by the number of goods and services it can command. Historical evidence has proved the unstable value of money even when it is convertible to gold, like the inflation in the gold rush from California and Australia between 1849 and 1860,²²¹ and further inflation during the Civil War when the greenbacks were issued in excessive quantities.²²²

214. Adrian & Shin, *supra* note 210, at 43.

215. *See id.*

216. Cheryl L. Edwards, *Open Market Operations in the 1990s*, 83 FEDERAL RESERVE BULLETIN 859 (1997).

217. *See id.* at 8–11.

218. *See id.* at 49.

219. Lender of resort typically refers to a situation where the central bank provides emergency credit to financial institutions that are financially illiquid but solvent. Michael D Bordo, *The Lender of Last Resort: alternative Views and Historical Experience*, 76 FRB RICHMOND ECONOMIC REVIEW 18, 18 (1990).

220. Adrian & Shin, *supra* note 210, at 45.

221. The gold rushes in California and Australia between 1849 and 1860 led to a significant increase in the supply of gold, which caused inflationary pressures in both areas. Ralph J. Roske, *The World Impact of the California Gold Rush 1849-1857*, 5 ARIZ. AND THE WEST 187, 187 (1963).

222. During the Civil War, the Union government issued a large number of greenbacks, which were paper currency not backed by gold or silver. This led to significant inflation, as the increase in the money supply led to an increase in prices. *See* Ben Baack, *America's First Monetary Policy: Inflation and Seigniorage During the Revolutionary War*, 15 FIN. HIST. REV. 107, 120 (2008); Michael F Bryan, *On the Origin and Evolution of the Word Inflation*, FED. RSRV. BANK CLEVELAND ECON. COMMENT., Oct. 1997, at 1, 2.; Richard C.K. Burdekin & Marc D. Weidenmier, *Inflation Is Always and Everywhere a Monetary*

There was continuous deflation after the Civil War when the greenbacks were reduced in number and redeemable in gold, and the return to the single gold standard from both gold and silver led to a “scramble for gold” among countries.²²³

The gold standard may not provide sufficient flexibility in the money supply, because the supply of newly mined gold is not closely related to the growing needs of the world economy.²²⁴ In an interconnected world, a state may not be able to isolate its economy from depression or inflation from the rest of the world, and the process of adjusting for a country with a payment deficit can be long and painful, accompanied by an increase in unemployment and economic depression.²²⁵ In short, the value of money cannot be stable if it is mechanically anchored to the quantity of a physical thing that is not adjusted to social needs.

iii. Algorithmic adjustment of volume

Algorithmic stablecoins that claim to maintain price stability through volume adjustments are more difficult to achieve. Indeed, the value of money is affected by the quantity of money in circulation.²²⁶ The money supply encompasses the collection sum of money in circulation, including cash, coins, and balances held in bank accounts.²²⁷ The quantity theory of money asserts that variations in the overall level of commodity prices are primarily influenced by alterations in the quantity of money in circulation.²²⁸ The theory dates back to the mid-sixteenth century when the French social philosopher Jean Bodin first attributed the price inflation then raging in Western Europe to the abundance of monetary metals imported from the mines of the Spanish

Phenomenon: Richmond vs. Houston in 1864, 91.5 AM. ECON. RE. 1621, 1625 (2001).

223. IRVING FISHER, *THE MONEY ILLUSION* 41 (1928).

224. Richard N Cooper, *The Gold Standard: Historical Facts and Future Prospects*, 1982 BROOKINGS PAPERS ON ECON. ACTIVITY 1, 29 (1982).

225. Peter Temin, *Transmission of the Great Depression*, 7 J. ECON. PERSP. 87, 90–92 (1993).

226. Thomas M Humphrey, *The Quantity Theory of Money: Its Historical Evolution and Role in Policy Debates*, 60 FRB RICHMOND ECON. 2, 2 REV. (1974).

227. *What Is the Money Supply? Is It Important?*, BD. OF GOVERNORS OF THE FED. RES. SYS. (Dec. 16, 2015), https://www.federalreserve.gov/faqs/money_12845.htm.

228. Humphrey, *supra* note 226.

colonies in South America.²²⁹ In the late seventeenth and eighteenth centuries, the theory experienced a process of confinement, elaboration, and extension through the contributions of John Locke, Richard Cantillon, and David Hume. Subsequently, it became integrated into the mainstream of orthodox monetary tradition.²³⁰ One of the advocacies of the quantity theory is to preserve the gold standard.²³¹ Throughout the twentieth century, the quantity theory of money thrived within the doctrines of the monetarist school, led by influential figures such as Milton Friedman, Karl Brunne, Allen Meltzer, Philip Cagan, and several others.²³² Essentially, the quantity theory attributes changes in the value or purchasing power of money to its quantity.

The Fisher equation established the link between money supply and price level,²³³ which mathematicised the quantity theory of money.²³⁴ The equation ($MV=PY$) roughly states that the quantity of money in circulation (M) multiplied by the circulation velocity of money (V) equals the average price level (P) multiplied by the value of all transactions (Y). According to this equation, the price level and nominal wage rate depend on the level of the money supply. If the amount of money in an economy doubles, all else equal, price levels will also double. In the short run, rising price levels cause disturbance in the market. In the long run, inflation can be neutral in terms of economic development.²³⁵ According to Fisher, the distinction between the short run and the long run arises from phenomenon of “money illusion,” where firms and households struggle to differentiate between nominal and real interest rates.²³⁶ The nominal interest rate that equates to borrowing and lending will normally adjust

229. Tommi Lindfors, *Jean Bodin (c. 1529–1596)*, INT'L ENCYC. OF PHILOSOPHY, <https://iep.utm.edu/bodin/> (last visited June 22, 2023).

230. Humphrey, *supra* note 226.

231. MICHAEL D BORDO & ANNA J SCHWARTZ, *A RETROSPECTIVE ON THE CLASSICAL GOLD STANDARD 1821-1931* (University of Chicago Press, 2009).

232. Humphrey, *supra* note 226.

233. IRVING FISHER, *THE PURCHASING POWER OF MONEY: ITS DETERMINATION AND RELATION TO CREDIT INTEREST AND CRISES* 47 (2006).

234. Friedman, *supra* note 82, at 3–4.

235. IRVING FISHER, *THE PURCHASING POWER OF MONEY: ITS DETERMINATION AND RELATION TO CREDIT INTEREST AND CRISES* 47 (2006).

236. PERRY MEHLING, *FISHER BLACK AND THE REVOLUTIONARY IDEA OF FINANCE* 146 (2005).

for any inflation that is expected to reduce the value of money, but that adjustment is usually incomplete.²³⁷

Nonetheless, algorithmic stable value is a very dubious claim because value possessing control completely independent from other assets, if ever possible, is very difficult. No product or service exists in a vacuum, and they are more or less affected by the price and quantity of other products. The closest analogy of algorithmic stablecoin may be unbacked central bank money that is based purely on trust in the central bank and the government's taxation power. Otherwise, private money issued by banks and other financial institutions conforms to the quantity theory of money based on some idealized assumptions. The Fisher equation and the quantity theory of money are based on several assumptions, such as an equilibrium between supply and demand.²³⁸ Yet market spending and demand for money are sometimes inelastic and even perversely positive concerning the general level of interest rates.²³⁹ In the short run, fluctuations in the quantity of money are endogenous, determined by demand, not by central bank policy.²⁴⁰ An endogenous money supply may exacerbate a boom, and a contracting money supply will exacerbate a recession.²⁴¹ The problem is how to rein in this natural tendency toward instability. In times when the demand is not elastic, or when the rate level is not sufficiently significant to trigger the market reaction, the supply of credit plays a definitive role in the growth of credit and the prevention of a "credit crunch."²⁴²

Existing laws and regulations offer countercyclical policy instruments for the stability of monetary and financial systems.²⁴³

237. Michael R Darby, *The Financial and Tax Effects of Monetary Policy on Interest Rates*, 13 *ECON. INQUIRY* 266, 266 (1975).

238. Anthony J. Evans & Robert Thorpe, *The (Quantity) Theory of Money and Credit*, 26 *REV. OF AUSTRIAN ECON.* 463, 471 (2013).

239. Wojnilower, *supra* note 88, at 277.

240. Basil J Moore, *Some Reflections on Endogenous Money*, in *CREDIT, INTEREST RATES AND THE OPEN ECONOMY* (2000).

241. Bruce C. Greenwald & Joseph E. Stiglitz, *Financial Market Imperfections and Business Cycles*, 108 *QUARTERLY J. ECON.* 77, 111 (1993).

242. Albert M Wojnilower, et al., *The Central Role of Credit Crunches in Recent Financial History*, 1980 *BROOKINGS PAPERS ON ECONOMIC ACTIVITY* 277, 277 (1980).

243. Bart Stellinga, *The Open-endedness of Macroprudential Policy. Endogenous Risks as an Obstacle to Countercyclical Financial Regulation*, 22(1) *BUS. AND POL.* 224, 224 (2020).

During the Great Depression or recessions, the law may stimulate insufficient aggregate demand by authorizing expansive fiscal and monetary policy and providing a last-resort tool.²⁴⁴ Effective policies should be conditioned upon market situations, balancing freedom, fairness, and aggregate welfare. Macro-awareness of financial regulation, such as mortgage regulation, which is traditionally understood as a microeconomic endeavor,²⁴⁵ has been realized.²⁴⁶ Quantitative easing, whereby a central bank purchases government bonds or other financial assets at scale, may stimulate the economy, but risks price inflation and asset bubbles.²⁴⁷ Unfair discrimination, manipulation, and coercion through quantitative easing are sometimes indefinable.²⁴⁸

The value of money is dynamic and multifaceted. The stable value of money is measured in terms of the exchange with other assets, like gold, bonds, and commodities, as well as future money. It can be difficult to simultaneously have a stable value in exchange for all assets, in the short and long run. Policy and law-making will choose between these asset prices and the value of money, preferably to maintain price stability in normal times while adjusting the value of money in special times.

Given the difficulty and complexity of the price maintenance mechanism, it is necessary for stablecoin issuers to explain the meaning and mechanism of value maintenance, such as whether some assets are linked or not. At one extreme, the creation of such algorithmic stablecoin may be a scam—the issuer creates something from nothing and collects lots of funds in the market. If regulators have clear evidence of fraud, relevant stablecoin issuance should be banned. On the other hand, even if the value of a single stablecoin can remain stable to a certain extent over some period, the linkages between different financial products and systemic risks still need to be closely observed. As will be

244. YAIR LISTOKIN, *LAW AND MACROECONOMICS: LEGAL REMEDIES TO RECESSIONS* 28 (Harvard University Press, 2019).

245. Patricia A. McCoy & Susan M. Wachter, *The Macroprudential Implications of the Qualified Mortgage Debate*, 83 L. & CONTEMPORARY PROBLEMS 21, 22 (2020).

246. David Aikman et al., *Would Macroprudential Regulation Have Prevented the Last Crisis?*, 33 J. ECON. PERSP. 107, 107 (2019).

247. Michael Joyce et al., *Quantitative Easing and Unconventional Monetary Policy—an Introduction*, 122 ECON. J. 272, 272 (2012).

248. C. FRED BERGSTEN & JOSEPH E GAGNON, *CURRENCY MANIPULATION, THE US ECONOMY, AND THE GLOBAL ECONOMIC ORDER* Peterson Inst. for Int'l Econ. Order) 13 (2012).

explained below, regulators need to set several important disclosure indicators—such as the numbers of stablecoins issued and in circulation, and price and transaction velocity, to monitor single product risks and systemic stability.

3. Issuance quantity.

According to the quantity theory of money, the value of money affects and is affected by the supply and demand of money.²⁴⁹ A sudden increase in the money supply can lead to inflation²⁵⁰ and systemic instability.²⁵¹ As stated above, other things equal, monetary expansion will raise the price level. Inflation does not make a society richer; it only enriches the government or company that monopolizes the creation of money. The quantity and liquidity of money drives the financial system towards instability, as they contribute to cyclical structures which tend to amplify financial distress and drive the system towards larger crises.²⁵²

The rationale for money creation shows the potential externalities are caused by the money issuer. Whether it be public or private issuers, there are problems with the responsible agency and credible commitments.²⁵³ The rational expectation²⁵⁴ and the public choice theories²⁵⁵ point out the significance of rational choice by all rational beings. Public and private money issuers all have their optimal strategies to maximize profit, which may be earned at the cost of public interest. In light of the public

249. PATNAIK, *supra* note 72, at 6.

250. Frank Browne & David Cronin, *Commodity Prices, Money and Inflation*, 62 J. ECON. & BUS. 331, 332 (2010).

251. Andrew F. Brimmer, *Distinguished Lecture on Economics in Government: Central Banking and Systemic Risks in Capital Markets*, 3 J. ECON. PERSP. 3, 11 (1989).

252. Marco Bardoscia, et al., *Pathways towards Instability in Financial Networks*, 8 NATURE COMM'NS Feb. 2017, at 1, 1.

253. Oliver E. Williamson, *Credible Commitments: Using Hostages to Support Exchange*, 73 AM. ECON. REV. 519, 519 (1983).

254. Thomas J Sargent & Neil Wallace, *Rational Expectations and the Theory of Economic Policy*, 2 J. OF MONETARY ECONOMICS 169, 169 (1976); Stanley Fischer, *Long-term Contracts, Rational Expectations, and the Optimal Money Supply Rule*, 85 JOURNAL OF POLITICAL ECONOMY 191, 191 (1977).

255. J. Mark Ramseyer, *Public Choice* (Coase-Sandor Inst. for L. & Econ., Working Paper No. 34, 1995); JAMES D. GWARTNEY, et al., *ECONOMICS: PRIVATE & PUBLIC CHOICE* 267 (17th ed. 2021).

choice theory,²⁵⁶ bankers, regulators, and legislators have their own interests in implementing a certain policy besides the public interest, based on their rational expectations.²⁵⁷

Banks, financial intermediaries, and money market funds can engage in balance sheet operations that serve the dual purpose of intermediating existing money and creating new money. The currency school advocates for the segregation of money creation and intermediation between savers and lenders.²⁵⁸ It supports the idea of regulating money creation through specific rules while allowing intermediaries to compete freely without government regulation or assistance.²⁵⁹ One reason why the money creation and intermediation function should be separated is that banks' portfolios with illiquid mortgages can be abused or distorted by the government, such as through the encouragement of house ownership, leading to the subsequent housing bubble.²⁶⁰ It has been evidenced that the global financial crisis is the result of an interaction between cycles in the housing market and bank credit expansion.²⁶¹

It is a collective action problem that no single entity or individual has the motivation to guarantee the stable value of money in a decentralized network. The issuing entity wants unlimited power to mobilize and utilize resources in society. Users hope the money they hold appreciates, so they earn more. Such a mentality can be exploited by the money issuer to create more money that has no real value in and of itself. Such exploitation of market mentality or autonomy is undesirable. From an economic perspective, this seems an unfair advantage that the money issuer has taken from the market, as the issuer will more likely than not possess some of these kinds of money. Moreover, over-issuance can cause depreciation of monetary value and even inflation, which have negative consequences for the economy and

256. GEORGE A. BOYNE, PUBLIC CHOICE THEORY AND LOCAL GOVERNMENT (1998).

257. John F. Muth, *Rational Expectations and the Theory of Price Movements*, *ECONOMETRICA: J. ECONOMETRIC SOC'Y* 315, 315 (1961).

258. Charles Goodhart & Meinhard Jensen, *Currency School versus Banking School: an ongoing confrontation*, 4 *ECON. THOUGHT* 1, 9 (2015).

259. *Id.* at 9.

260. PETER J. WALLISON, HIDDEN IN PLAIN SIGHT: WHAT REALLY CAUSED THE WORLD'S WORST FINANCIAL CRISIS AND WHY IT COULD HAPPEN AGAIN 23 (2015).

261. Òscar Jordà, et al., *Betting the House*, 96 *J. OF INT'L ECONOMICS* S2-S18, S2 (2015); Òscar Jordà, et al., *The Great Mortgaging: Housing Finance, Crises and Business Cycles*, 31 *ECONOMIC POLICY* 107, 123 (2016).

society as a whole. At the pollical level, a large money network will generate huge market power that influences the value and safety of people's assets as well as people's autonomy in participating in this network.

The idea of controlling the quantity of money in circulation has a long history. In the gold coinage era, the government could not reduce the weights of the gold and silver coins at will,²⁶² because reducing the weight of metal coins would enable governments to create more money.²⁶³ Franco Modigliani's idea to rein in the natural tendency toward instability is for the central bank to establish a target for the money supply and penalize deviations from that target.²⁶⁴

During the era of gold standard, the absence of regulation resulted in various consequences. These included an increase in domestic prices compared to foreign prices, unfavorable balance of payments, weakened foreign exchange, outflow of gold, depletion of gold reserves, and the suspension of convertibility.²⁶⁵ These instabilities stemmed from prolonged time lags that hindered banks' policy responses to gold outflows, thereby impeding their ability to timely protect the special reserve and undermining public confidence in their capability to maintain convertibility.²⁶⁶ Furthermore, when the bank eventually implemented restrictive policies to counteract the loss of gold, these policy actions often coincided with and exacerbated social panics and liquidity crises triggered by excessive currency and credit.²⁶⁷ The prevalence of time lags in the response of spending and prices to changes in the money supply, along with policymakers' delayed response to economic changes, could render discretionary stabilization efforts ultimately destabilizing.²⁶⁸

What is more, if the amount of currency issuance depends on capital capacity, this will only allow companies with large capitals to have greater market influence. These companies may

262. Martin Allen, *Currency Depreciation and Debasement in Medieval Europe* in *MONEY IN THE WESTERN LEGAL TRADITION* 41, 49 (David Fox & Wolfgang Ernst eds. 2016).

263. *Id.* at 48.

264. Franco Modigliani, *The Monetarist Controversy, or, Should We Forsake Stabilization Policies?*, *AM. ECON. REV.* 1, 2 (1977).

265. Humphrey, *supra* note 226, at 8.

266. *Id.* at 9.

267. *Id.*

268. *Id.*

become new types of “too big to fail” or “too connected to fail” (financial institutions that are too large or too interconnected with each other that their failure would be disastrous to the whole economy, and the government tend to bailout these institutions when they face potential failure). This creates greater moral hazards, harms market competition, and threatens system stability.²⁶⁹ Such limits on currency in circulation have been considered by the digital euro project, in which the excess amount would be automatically transferred to an account in private money paired with the digital euro account.²⁷⁰ Therefore, strict regulation of the volume of banknotes is needed to prevent the recurrence of gold drains, exchange depreciation, and domestic liquidity crisis.²⁷¹

Consumers and regulators should be informed about the number of stablecoins issued and the mechanism of issuance, under which circumstances the issuer will increase or decrease stablecoins, and how the stablecoins are issued, retained, or destroyed. Historical data should be retained so that consumers can form a more objective and comprehensive judgment.

4. Risk factors.

Stablecoin issuers are obliged to disclose risk factors that may cause stablecoin value fluctuations. From an economic perspective, the stable value of money is an equilibrium that comes up at some point.²⁷² Yet money supply and demand do not always match, which is a fundamental flaw of the market mechanism. Fluctuations in the value of the reserve or pegged assets can also affect stablecoin prices. Issuers should disclose the risk factors they recognize. This also means that the issuance of stablecoins requires a certain degree of expertise or professionalism to have forward-looking forecasts and early warnings for price fluctuations.

269. Imad Moosa, *The Myth of Too Big to Fail*, 11 J. OF BANKING REG. 319, 316–17 (2010).

270. EUROPEAN CENTRAL BANK, DIGITAL EURO EXPERIMENTATION SCOPE AND KEY LEARNINGS 1 (2021) <https://www.ecb.europa.eu/pub/pdf/other/ecb.digital-euroscopekeylearnings202107~564d89045e.en.pdf>.

271. Goodhart & Jensen, *supra* note 258, at 9.

272. Gary S. Becker, *A Theory of Competition Among Pressure Groups for Political Influence*, 98 Q. J. OF ECON. 391, 379–80 (1983).

C. Transaction Rules

The issuer should disclose the distribution channels and methods of the stablecoin, including whether trading is available on an aggregated basis with other platforms, names, and access to the trading platforms.

To align their public statements with the actual operation, stablecoin issuers should be required to disclose the procedure for returning digital assets upon customer request, any applicable fees, and the dispute resolution process. This may, in many cases, take the form of a term of service. Stablecoin issuers and trading platforms should agree on terms of settlement finality for all transactions, including the conditions under which a digital asset may be deemed fully transferred. This will help clarify when the risk of loss transfers.

It is expected that transaction disclosure could help regulators design transaction rules in the future. For instance, regulators could require lower or zero interest rates to discourage mass storage and withdrawal of stablecoin deposits. They can set limits on exchange rates, so the value of stablecoin is under regulation and emergency control. The endorsement or penalty by the government could lower the information cost of producing money by influencing the predictability and stability of exchange rates. In case of market runs, regulators can establish circuit breaker mechanisms to temporarily halt trading and avoid panic selling when volatility is high and flows to a homogenous end as well as with ordinary borrowing, lending, buying, and selling of its currency against other currencies.

IV. STANDARDIZED AND STRUCTURED DISCLOSURE

Accessible and usable disclosures are essential for the regulator to protect investors, and maintain fair, orderly, and efficient markets.²⁷³ The disclosure mechanism of stablecoins needs to be standardized for easier understanding, comparison, integration, and processing of disclosed information. Standardization is particularly important for sensitive data such as financial information, where errors and inconsistencies can lead to systemic understanding and behavioral deviation. With standardized data, data processing techniques can be employed to identify

273. Jeremy Schara, *Knowledge Is Salvation: Informing Investors by Regulating Disclosures to Safeguard Best Execution*, 43 HOFSTRA L. REV. 1231, 1247–48 (2014).

significant transaction patterns and risks. This will help regulators understand changing and complex market conditions and formulate targeted and proportional regulatory rules (such as capital requirements or trading restrictions).

At a substantive level, standardized disclosure relies on common understanding of key concepts, such as the connotation and denotation of stablecoins. While different jurisdictions may divide cryptocurrencies into different categories,²⁷⁴ a common taxonomy of cryptocurrency that includes stablecoins can ensure that regulators refer to the same regulatory terms and items. This can promote a more consistent and unified approach to regulation, reduce regulatory arbitrage, align market expectations, and increase consumer welfare. A common taxonomy can be developed by bringing together industry experts and regulators to define and agree on a set of standard terms and definitions for cryptocurrencies, which is to be adopted in countries that allow cryptocurrency operation.

In order for better standardized disclosure, a centralized governance institution is needed to align the standards. Although stablecoins are not necessarily recognized as securities to be regulated by the SEC, the current standardized disclosure tools used by the SEC are worth referring to or learning from. The disclosed material must be clear, comprehensive, and accurate, and easy to understand. Furthermore, the SEC has a variety of structured disclosure tools based on standardized languages and frameworks, such as Form N-MFP (monthly schedule of portfolio holdings of money market funds), Form 13F (institutional investment managers reporting form structured using XML), Form D (notice of an exempt offering of securities) and Forms 3, 4 and 5 (beneficial ownership of securities filed via a web form).²⁷⁵ The SEC has used eXtensible Business Reporting Language (a standards-based global framework for exchanging business information) to structure data, which can be applied for stablecoins disclosure.²⁷⁶

274. A.G. Luchkin et al., *Cryptocurrencies in the Global Financial System: Problems and Ways to Overcome Them*, at 426 (2020).

275. *Structured Disclosure at the SEC: History and Rulemaking*, SEC (last modified Mar. 24, 2023), <https://www.sec.gov/page/osdhistoryandrulmaking>.

276. Eileen Z. Taylor & Ann C. Dzurainin, *Interactive Financial Reporting: An Introduction to eXtensible Business Reporting Language (XBRL)*, 25 ISSUES IN ACCT. EDUC. 71, 71–72 (2010).

It is also desirable that globally consistent standards could be developed to promote the reliability and availability of data. With global standards in place, it is easier for entities and individuals to share and compare data across different organizations and jurisdictions. This will increase transparency and accuracy of data analysis. Establishing these standards needs to consider all stakeholders' opinions. The first step is to identify the relevant stakeholders who would be impacted by the standards. This could include regulators, industry associations, businesses, and technology providers. Second, the standard-setting body needs to define the scope of the standards, such as the type of data that would be covered by the standards, as well as the data sources and technologies that would be used. Third, the standard-setting needs to balance efficiency, accessibility, and security of data. When the standards are designed and implemented, the standard-setting body needs to monitor and update the standard to guarantee its efficiency and effectiveness as part of the global digital infrastructure.

CONCLUSION

Stablecoin is an attempt at private money in the digital age.²⁷⁷ There is no consensus among countries on the regulation of digital private money.²⁷⁸ One view is that cryptocurrency is a security (investment contract) and regulation should focus on disclosure; as a type of cryptocurrency, stablecoins should fall within securities regulation.²⁷⁹ Another view is that stablecoins are a means of payment and should be issued by depository institutions, and thus should be subject to more stringent requirements on the issuer's qualifications and business operation.²⁸⁰ Apart from existing political and economic considerations, it remains to be seen to what extent the market, with the technologies available, can sustain the operation of reliable and sustainable private money such as stablecoins. For the regulation of private money, many experiences and rationales of fiat money do not apply. This is because the two have different political economy

277. Jamie Morgan, *Systemic Stablecoin and the Brave New World of Digital Money*, CAMBRIDGE J. ECON. 215, 217 (2023).

278. Luchkin et al., *supra* note 276, at 427.

279. HM Treasury, *UK Regulatory Approach to Cryptoassets and Stablecoins: Consultation and Call for Evidence*, at 13 (2021).

280. Howell E Jackson et al., *How We Can Regulate Stablecoins Now—Without Congressional Action*, at 11 (Hutchins Ctr., Working Paper No. 76, 2022).

assumptions and market circulation mechanisms, which affect the source of value, the limits of credit extension and thus price stability. In addition, the risks and regulatory methods of stablecoins are not entirely determined by the stablecoin itself and its issuer but are affected by the spillover effects of a transaction by social entities and in exchange for other financial and non-financial assets.

On nearly every regulatory issue, regulators face various qualitative and quantitative judgments. Yet the observation and collection of information should not be entirely passive. A mistake that regulators can make is to wait until the regulatory regime is perfected before requiring issuers to disclose information in accordance with legal and regulatory rules. The problem with this strategy is that regulatory regimes for a debatable phenomenon like private money are not built in a day. In the increasingly complex financial market and monetary system, regulatory rulemaking should be determined by market conditions rather than hypothetical risks or benefits. A major source of regulatory authority is expertise, and expert conclusions are not purely theoretical or hypothetical, but should be based on empirical evidence. Therefore, disclosure or collection of information should, in a large part, precede regulatory rulemaking. Regulators should proactively understand market opportunities and risks based on available resources, affordable costs, and technical conditions.

In this regard, stablecoin disclosure is of greater significance to consumer protection and regulatory notification. A major principle of information disclosure is standardization.²⁸¹ This not only helps consumers understand the role and risks of stablecoins, but also helps regulators collect data for analysis and processing. Big data will be used for constructing information and digital infrastructure, which will play a more important role in governance and regulation in the long run. Before formal rules are promulgated, regulators can allow mandatory yet flexible information disclosure. Mandatory disclosure of such information means that required items must be disclosed in a required manner. Flexibility can be allowed in the specific content of information disclosed, such as the qualification and governance of stablecoin issuers, the quantity, price, and velocity of

281. See generally George Loewenstein et al., *Disclosure: Psychology Changes Everything*, 6 ANN. REV. ECON. 391, 406 (2014).

stablecoins, and potential market and credit risks. At this stage, the main purpose of this is to allow the market to make autonomous choices based on available information, whether consumers buy and use stablecoins and to what extent they would like to do so. In the long run, stablecoins are likely to be subject to similar regulations of banks, depository institutions, or money transmitters. The key is to formulate restrictions and standards proportional to the risk, which requires lots of empirical data analysis for justification.